# MOTOR AGE

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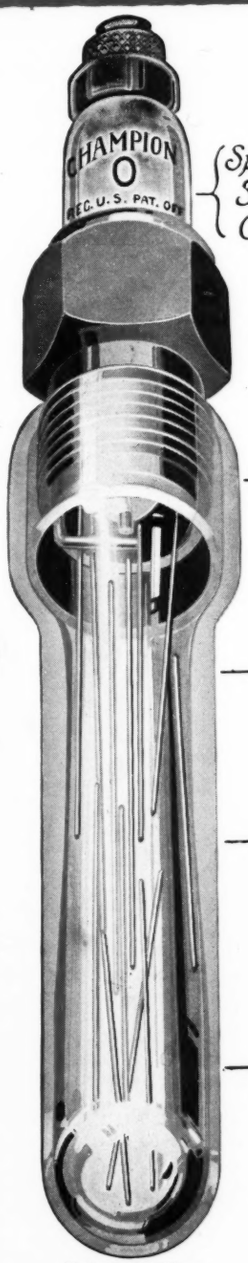


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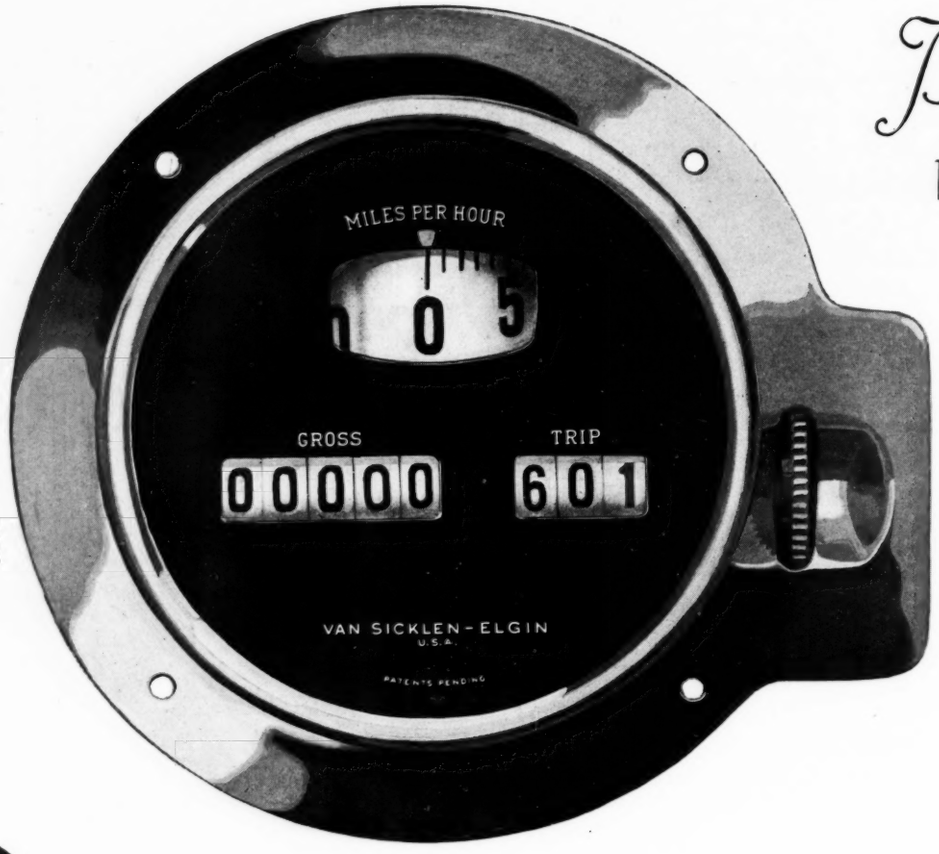
*Built Like an Elgin Watch by Elgin Watchmakers*

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# MOTOR AGE

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### ANNOUNCEMENT

**The feature of Motor Age for next week will be an article on staging the used car show. Chicago's dealers are preparing to exhibit at a "great central market used car show." This opens Saturday and will be in full swing by the next issue.**


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MOTOR AGE

# Battlefield Tests Bring Out Military Truck Defects

*Lancia armored car, which has had its hood and radiator blown away by shell fire*

In Two Parts—Part I

## Weakness and Strength of Vehicles Under Fire as Expressed by an Authority

*EDITOR'S NOTE—It is our belief that no better information on the use of motor cars, trucks and ambulances in war has reached this country than that written by W. F. Bradley, Motor Age's special war correspondent in Europe. He has been closely in touch with motor activities in European countries for many years and his work in the ambulance service of Italy and close connection with the motor divisions of the allied armies on other fronts puts him in a position to criticize motor performance with an authority which few if any other war writers have. In this two-part article he tells of the defects shown by motor vehicles when put through war's acid test*

By W. F. Bradley

WAR is the supreme test of motor vehicle design and construction. The stunt performances which are carried out from time to time by car and truck factories, either for the benefit of the engineering department or the advertising manager, or both, are equalled in every-day service by trucks and cars just behind the front line trenches. There is this essential difference, that when a motor car factory decides on some severe test—a transcontinental trip, for instance—it starts with a well-prepared machine in the hands of its most skilled driver and mechanic. Under active war conditions such performances have to be equaled with drivers of very ordinary ability and without any mechanical expert in the near background. A defect which can be tolerated in private service, because it is nothing more than an inconvenience, and can be prepared for and met under the most advantageous conditions, becomes a course under active war service.

**Trucks Constantly Under Fire**

It is the intention to point out some of the defects and weaknesses which have revealed themselves under active service. By this is not meant convoy work 15 or 20 miles behind the lines, where roads are good, shells are unknown, and, with proper organization, conditions need not be very much more severe than in private service. The experience covers vehicles which are constantly under fire. There are hundreds, thousands, of such vehicles on the various fronts of Europe. The expression "under fire" does not imply stretches of road on which shells are falling as thick as hailstones in a storm, but they are felt and heard daily, hourly, by every motor vehicle driver attached to the front line forces. Working under fire does not mean that a car is disabled every time a shell bursts. Only mules and horses are irretrievably lost by splinters of shrapnel. A motor truck or car may be within effective distance of hundreds of exploding shells and, unless some essential organs happen to be hit, emerges none the worse for it.

The term "active service" does imply running over roads which can never be

*This is an example of strenuous car conditions which motor equipment must withstand*

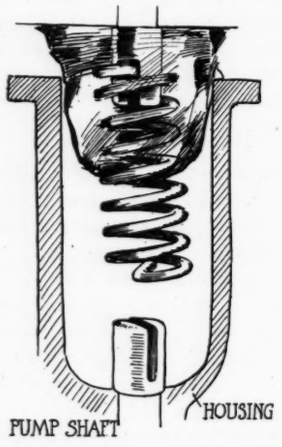
repaired—if we refuse to recognize the dumping of earth and bricks as repair work; it means going over those roads at a fast pace, for it is beyond human nature to keep the foot off the accelerator pedal when the whistle of oncoming shells is heard; it means driving at night in such black darkness that even the glow of a lighted cigarette in the mouth of a mechanic on an approaching vehicle is helpful and welcome; it means garaging the cars in some wrecked courtyard, probably inches deep in mud; it means no facilities for washing other than the river or a stream, when business is slack; it means doing all repair work in the open air with shells passing overhead in both directions; it means satisfaction with a very meager set of tools.

**Trucks of All Countries**

The experience dealt with here covers work on the Italian front, where conditions were unusually strenuous, but also where the variety of vehicles was not great and their mechanical efficiency was too high for the man who is principally interested in defects. The vehicles comprised all the Italian makes, also Buicks, G. M. C., Overland, Ford and a sprinkling of English, French and Belgian touring car chassis. Little will be said about the qualities of these cars, for this story is not written with a view to giving copy to the publicity man. Many of the cars to which most persistent reference is made have done, and are still doing, remarkably good work. That, however, does not make them free from criticism.

Clean-cut motor design is much more important to the driver in the war zone than would appear at first sight. The conventional L-head type, with inclosed valves, bolted-on ribbed exhaust manifold — a straight length—integrally-cast intake manifold, with carbureter bolted direct to the cylinder casting, magneto and pump driven from a cross-shaft in front of the engine, and a belt-driven fan, constitute the cleanest engine the most accessible, and the easiest to maintain. An engine of this type which can be cleaned in 5 min. with the aid of a kerosene brush and a rag, is much more likely to be kept in proper condition by the average driver than an engine of complicated and inaccessible design.

The valuable features of a valve-in-head motor are fully recognized, but they entail considerably more work than the type just described. There are eight push rods which call for very much more frequent adjustment than the inclosed tappets of the L-head motor. There are eight rocker arm ball joints which must be oiled once a day at least; there are four valve rocker shaft grease cups which also need daily filling. In hot weather, and if poor quality grease is given out, the lubricant will liquefy and disappear at such a rate that the cups have to be filled twice a day. This is unnecessary labor. On some engines the governor and timing gear housings have to be filled separately. This is a small matter on peace service, but it is very objectionable on strenuous war work. There is no necessity for a couple of long, small diameter breather tubes which also act as oil fillers. A very much better arrangement is a single big-diameter filler which also acts as breather.




*Setting spring for driving oil pumps by using thick grease to hold in place and keep it from wabbling*

**Good Oil Fillers Needed**

This naturally raises the question of oil control. The method of determining the level by a cock is not satisfactory, for if it is inside the mudpan it cannot be seen, and if outside the mouth of the cock is very quickly coated with mud and rendered useless. A float with indicator as used on one American engine was also found unsatisfactory, owing to its liability to wedge and in more than one occasion the float came adrift and was battered out of recognition by the connecting rods. A float with a vertical rod was also unsatisfactory, for unless protected by a tube the rod was liable to be bent or broken. The most satisfactory method observed on the Italian front was that adopted by Fiat, and consisting of a big-diameter filler and breather, with a hinged, clip-down top, and below it, at the correct height, another mouth with a hinged cover allowing the driver to look into the crankcase. To fill the crankcase the two lids were opened and it was impossible for the driver to make any mistake about the level, or to put in too much oil. It would overflow from the lower inspection hole when the correct height was passed. The only defect of this arrangement was the absence of a filter in the

mouth of the filler. This filter should have a big surface and be not very easily withdrawable, so that drivers will not be tempted to pour oil in direct.

War experience shows that an oil indicator is unnecessary. The U. S. A. glass sight feed on cars were quite useless, for after a few days the glass was so dirty that the flow could not be observed; in any case it was not visible from the driver's seat, and it was very liable to be broken by an accidental kick with the foot. All the Italian cars used a glass-faced pressure gauge which generally worked satisfactorily, although the small-diameter copper pipe would sometimes fracture, or the glass be broken.

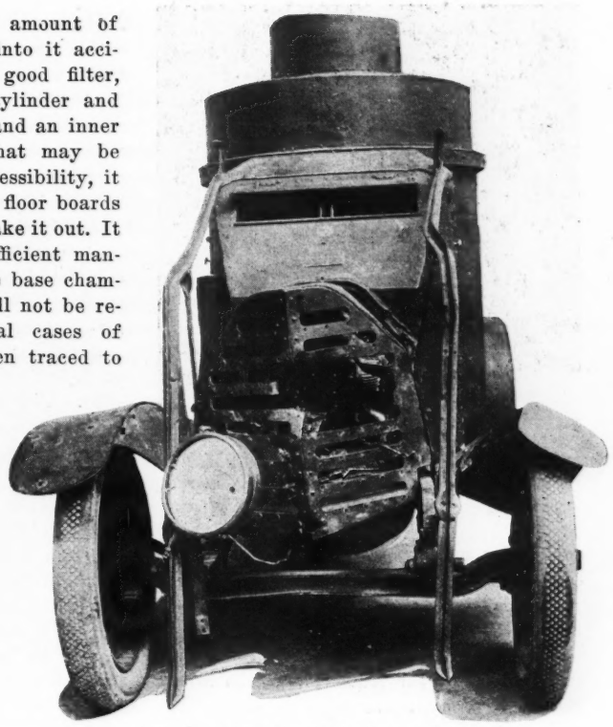
Between 40 and 50 Buicks and G. M. C.'s have been working on the Italian front for a year and a half without any dashboard indicator, or without any attention being paid to it, and with both American and Italian cars the writer never heard of a single case of oil pump failure. It is an easier matter to get drivers to verify the oil level than to keep an eye on the oil indicator; certainly the man who would not trouble to verify his oil would not watch a dashboard indicator. Even on war service cars are not run continuously for such a length of time that the oil supply is liable to become exhausted. On some of the Italian cars the oil pressure indicator was a danger, for owing to partial choking of the filter on the oil line a high pressure might be recorded while very little oil was getting through to the bearings. What is needed is a very simple and reliable oil level, but the oil indicator can be abolished as unnecessary. A few firms have realized this, the French Darracq, some Delages and Panhards, for instance, now being without indicators.

A filter on the oil line is very essential for war work, owing to the poor quality of oil usually supplied and the amount of foreign matter liable to get into it accidentally. Fiat has a very good filter, mounted just behind No. 4 cylinder and consisting of an outer coarse and an inner fine gauze. The objection that may be brought against it is its inaccessibility, it being necessary to remove the floor boards —screwed down—in order to take it out. It is certain that unless very efficient management prevails filters in the base chamber, and around the pump, will not be removed for cleaning. Several cases of burned out bearings have been traced to choked filters.

Besides being in an inconvenient position, the oil pump and filter on some cars are difficult to dismantle. The pump drive consists of a spring which fits in slots in the pump spindle and in the skew drive from the camshaft. The spring is difficult to erect, as the casing around it does not form a guide. It was found that the most practical way to erect this was to stick the spring into position in the top slot with thick grease, and then carefully enter pump into position. In some cases these springs were incorrectly assembled, with the result that on starting they would not only fail to drive the pump, but the spring itself would break. This arrangement is unsatisfactory in a workshop; it is not a job to be undertaken lightly when there is no cover for the cars and the ground has been plowed up until it is several inches deep in mud.

**Spare Oil Supply Wanted**

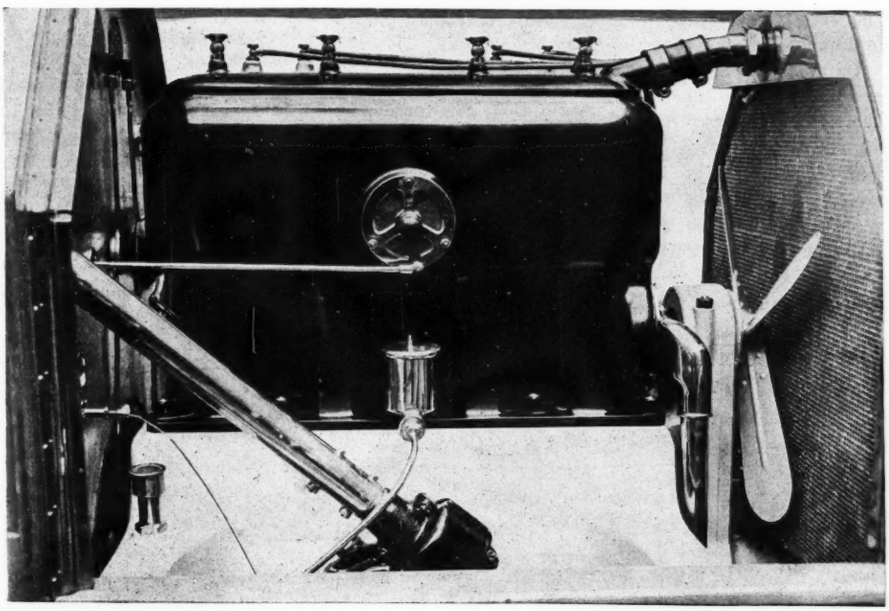
If designers and manufacturers thoroughly understood war conditions they would make provision for the carrying of spare oil in such a position that it would be kept warm from the heat of the engine, could be readily passed into the base-chamber and small quantities drawn off as required. No car was encountered on the Italian front in which this was done in a really satisfactory manner. On many cars it would be an easy matter to have a reserve oil tank on the front face of the dashboard with an oil lead direct to the filler and breather. This ought to be designed with the car and not put on as an afterthought.



*Lancia armored car that has suffered from shell fire*

The writer is decidedly in favor of the block casting for all but specially big engines. The difficulty of entering four pistons at one operation is more imaginary than real, for although there may not always be much tackling in the workshops at the front there is always plenty of labor. It is important, however, that the mouth of the cylinders be tapered to give an easy entrance for the pistons.

Thermo-syphon cooling has not proved a success on war service. All Fords going into service in Italy have a special big-capacity V-radiator, yet it was impossible to take these cars over many of the lower passes in summer time without the water boiling away. The only thermo-syphon car encountered on this front which gave satisfactory service under strenuous conditions was a Metallurgique touring chassis converted into an ambulance. This car did not have a fan other than the flywheel. Renaults kept sufficiently cool under normal roads, but lost water on heavy climbs. English Daimlers with pump gave trouble with overheating in the mountains. Generally English cars were inadequately



*A good example of clean Italian design. A Spa truck engine with motor pump in cylinder casting and fan driven off pump shaft*

*The type of steel disk wheel which has proved very efficient under war conditions*

cooled for mountain work, which in some cases was true of other cars.

The Continental motor on G. M. C. truck was rather overcooled. During the hottest portion of the summer, on the plains at the head of the Adriatic, it was rarely that the temperature of the water rose higher than a good average, while at night time they were running too cold, as shown by the Moto-Meter. Buicks, on the other hand, were inclined to run too hot, and although the writer found from experience that the water need not boil, even under strenuous conditions, the margin was so small that many drivers of lesser experience could not get over the hills without adding water.

**Gilled-tube Radiators Best**

The Fiats showed very careful designing in the matter of engine cooling, for with fan properly working it was impossible to make them overheat under any circumstances. With the fan belt off they would overheat in a quarter of an hour on level roads. These remarks refer to the models with belt-driven and not with flywheel fan.

Considering the conditions, very little radiator trouble developed. On a few makes too rigid a mounting was adopted, with the result that the radiator was strained and leaked after working on very rough roads. This straining was traced in several cases to the tie rod from the dash to the top of the radiator; with this rod removed, the radiator carried in trunnions, and a very flexible rubber connection from the top of the cylinders to the header tank, all trouble was avoided. The later Fiats had an exceedingly flexible mounting, for the trunnion bearings were rubber lined, and the rubber connection to the cylinder outlet pipe allowed the top of the radiator to be moved at least half an inch. It is doubtless due to careful design in this respect that so little radiator trouble developed on this make.

Honeycomb radiators are entirely out of favor on the Italian front, the great majority of cars and trucks having the gilled-tube type. The Gallay radiator, however, used by Lancia, gave very efficient service. In a large number of cases the gilled-tube radiators were fitted with a false front to give them the appearance of a honeycomb. This is done by Fiat, who has the false front for the touring models and gilled tubes without any disguise for trucks. Trouble developed in several cases by reason of the front edge of the engine hood rubbing on the radiator until a hole developed. This was particularly the case with a very flexibly-mounted radiator; the remedy, of course, is simple.

Both V-section and flat fan belts were used, but neither showed any great preference. The uniting of the fan blade tips by a ring was sometimes disadvantageous, for it prevented the belt being put on after it was sewn or riveted. In these cases the belt had to be riveted while around the pulley. There is very much in favor of the Spa practice of mounting the water pump in the cylinder casting and driving pump and fan from one shaft, without the use of a belt. It would be a very easy matter to incorporate a clutch with the fan drive, thus allowing the fan to be put into or out of motion as desired.

Not enough attention was always paid to complete drainage of radiator and waterjacket. So far as the former is concerned the best arrangement observed was a V-section pump, with a tap in its base, at least a couple of inches below the bottom of the radiator. On some makes there was no drain on the pump housing, with the result that water lodged there froze and caused the pump drive to shear.

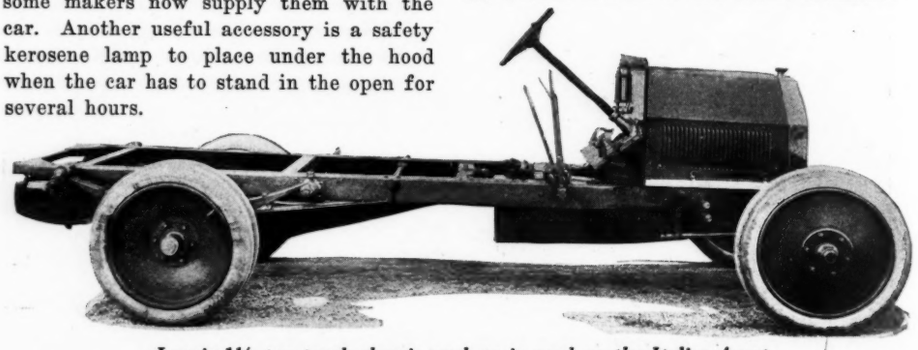
**If designers and manufacturers thoroughly understood war conditions they would make provision for the carrying of spare oil in such a position that it would be kept warm from the heat of the engine, could be readily passed into the base-chamber and small quantities drawn off as required. No car was encountered on the Italian front in which this was done in a really satisfactory manner.**

On much of the work at the front drivers are never aware whether they are leaving their cars for a few hours or for the whole of the night, thus it is desirable to keep the water in the radiator as long as possible. This can only be done if a complete tight-fitting cover is provided for both radiator and hood. Drivers were not long in devising these covers themselves; but some makers now supply them with the car. Another useful accessory is a safety kerosene lamp to place under the hood when the car has to stand in the open for several hours.

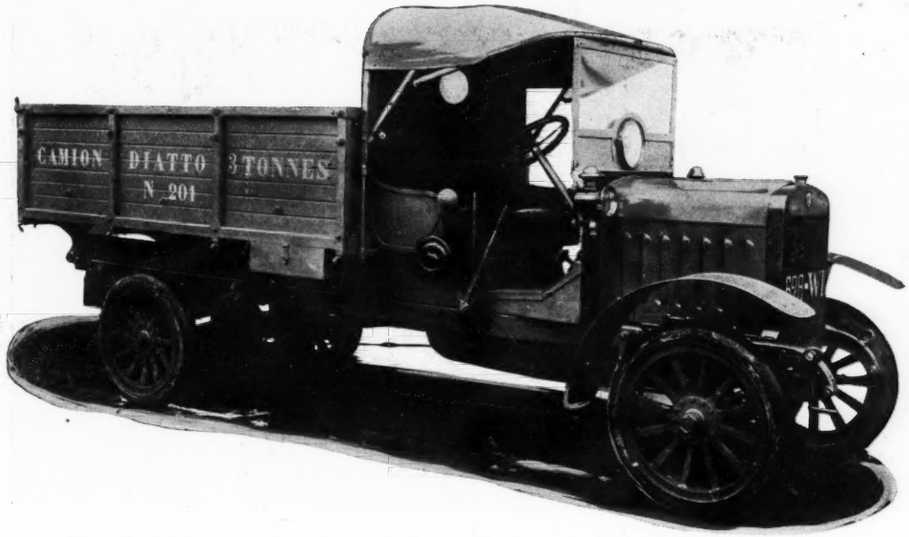
War service does not bring forth any very strong claim for variable cooling, but it does show that the most strenuous conditions have not always been anticipated, with the result that there is a rather general tendency towards overheating under the most severe conditions and also a tendency for the lower portion of the radiator to freeze on winter service over some of the Alpine passes. A thermostat is a rather delicate instrument to fit on a war service truck. A more general practice, in Europe at any rate, is to get carbureters which will work under a wide range of temperatures. Airplane experience has shown that this can be done. Engines are required to operate at 50 deg. C. and a few minutes later, after a rapid gliding descent, to pick up instantly and develop full power with the cooling water at only 5 or 6 deg. It is found better to get a carbureter capable of doing this than to fit variable cooling. This should be possible on truck work, where the rate of cooling is much less rapid. It would be an advantage, however, to provide shutters for the radiators, these shutters to work from the bottom upwards, so as to allow protection to be given to a required area of the cooling surface.

**Use Two Underpans**

This naturally leads to the question of underpans. It is a rather common Italian practice to use two underpans, the forward one protecting the engine and ending only an inch or so behind the flywheel, and the second one being under the gearbox and upswept at the front to allow a free exit of air from the engine housing. This arrangement is not satisfactory—it is decidedly unsatisfactory with flywheel fans—for while the hot air from the engine is got rid of with the least obstruction, under very muddy road conditions an immense amount of dirt is flung up, caught by the flywheel and scattered in every direction. It is not uncommon, under certain road conditions, for cars to be stopped from this cause alone. The most practical arrangement is for the mudpan to be in two parts, overlapping and extending from the radiator to behind the gearbox. The best arrangement is an attachment by spring-controlled bolts, the pan being attached not to the frame members, but to horizontal sheet metal guards either screwed or riveted to the frame members.



*Lancia 1½-ton truck chassis such as is used on the Italian front*




*Diatto 3-ton army truck. Note headlight in dash. Wood wheels are an exception. Radiator has no guard—that is a defect*

With this design one side of the pan can be lowered as easily as opening a door, and the whole pan can be taken down or replaced by one man in a minimum of time. It is rather surprising that at this day so many underpans cannot be dismounted or replaced except by a couple of men and at least an hour's labor.

**Manifold Difficulties**

Some trouble was experienced with cars having integrally-cast exhaust manifold. There were some cases of broken cylinders owing to excessive overheating at the exhaust manifold, which trouble was entirely avoided when the manifold was external. With a straight length of manifold there was the same valve accessibility as if it were cast with the cylinders. The big Fiat tractors suffered somewhat from the restricted size of the exhaust manifold and pipe. It was not at all uncommon to meet these tractors at night time, hauling heavy guns, with the whole of the exhaust pipe and muffler glowing red. The same applied to the Soler single-cylinder two-piston tractor. It is certain that this defect did not reveal itself under peace conditions, but it was developed with the combination of maximum loads, heavy roads, and indifferent drivers.

Shims for connecting rod bearings gave a lot of trouble. It was the practice on some cars to set the bearings up as tight as possible, but after a very short time the shims would hammer into the white metal, for there was not a phosphor-bronze backing the whole length of the bearings, and the bearing would become loose. In some of the repair shops so much annoyance was experienced that a new phosphor-bronze shell was turned up and the bearing set up without shims, as is the general European practice.

**Opposes Connecting Rod Shims**

No shims are used on Italian vehicles and their presence on American engines always met with the disapproval of the mechanical staffs. There were numbers of cases of melted connecting rod bearings provoked by this looseness for which the shims were primarily responsible. With this exception the bearings were well proportioned on English and American engines.

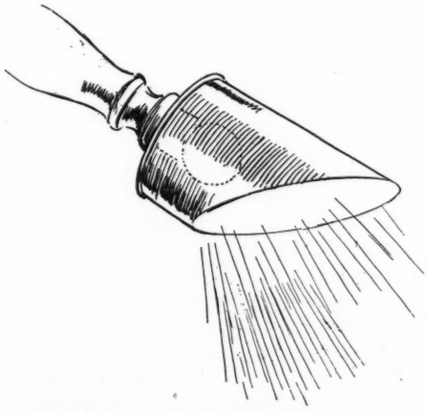
Main bearings gave little trouble. The few cases of failure which were reported were the center bearing, the supply of oil to this bearing being somewhat limited for strenuous service. This trouble experienced on some of the European cars was overcome by increasing the supply of oil at this point. Forced feed to the main bearings is certainly to be recommended in preference to merely circulating systems; no trouble was experienced with troughs for connecting rod bearings.

**Italy Uses Magnetos**

For ignition purposes, the entire Italian army makes use of high-tension magneto without any batteries either as an auxiliary or for ease in starting. The Delco system was regular equipment on the Buicks. It proved itself very satisfactory, only a few minor troubles being revealed, among them being an occasional failure of the cut-out. Incidentally a self-starter on an army vehicle appears to be an altogether unnecessary refinement. Regulations call for two men on every car at the front, and as they are both supposed to be capable drivers, and are dressed and equipped for their work, it is no hardship to get on to the road and crank a motor. There are half a dozen conveniences most army drivers would ask for in preference to a starter.

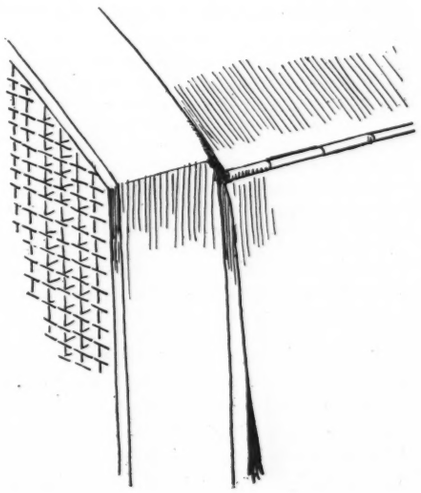
Some magnetos for the first six months were trouble-proof; after that they gave trouble. The magnets demagnetizing, platinum contacts wore out and screws came loose. It was not at all an unusual thing to take some magnetos out of the chassis four times a week to true up the platinum contacts.

Right here it is necessary to mention the greatest fault found on some engines is that the pump and magneto are set alongside the engine, the contact breaker box facing the rear. By pulling out the floor boards a contortionist might be able to see the contact points, but he could not adjust them while the magneto was in the chassis. To dismount it is necessary to unscrew four studs passing through the magneto platform into the magneto base; two were really quite sufficient. A mechanic with a small hand and a correctly shaped wrench could get these studs out without disturbing the underpan. A heavy fisted



*Nearly all the Buick drivers rigged up a special lamp for work close to the trenches. It consisted of a shaving soap stick cut like this*

**Clean-cut motor design is much more important to the driver in the war zone than would appear at first sight. The conventional L-head type, with inclosed valves, bolted-on ribbed exhaust manifold—a straight length—integrally-cast intake manifold, with carbureter bolted direct to the cylinder casting, magneto and pump driven from a cross-shaft in front of the engine, and a belt-driven fan, constitute the cleanest engine, the most accessible, and the easiest to maintain.**



*In a large number of cases the gilled-tube radiators were fitted with a false front to give them the appearance of a honeycomb. This is done by Fiat, who has the false front for the touring models and gilled tubes without any disguise for trucks*

man had to take the pan down, and might be anything from 1 to 3 hr. on a job which ought not to have occupied more than a few minutes. The job could have been very much simplified by using a flexible band fastening for the magneto; better still, the pump and magneto could have been driven off a cross shaft, with the contact breaker box pointing outwards and above the level of the frame members, thus making adjustment a very simple matter and capable of being performed without taking the magneto off the engine. The writer had in his charge for four months a Berling magneto on a Fiat engine; it gave no trouble at all and was running very satisfactorily when the car was turned over to another driver.

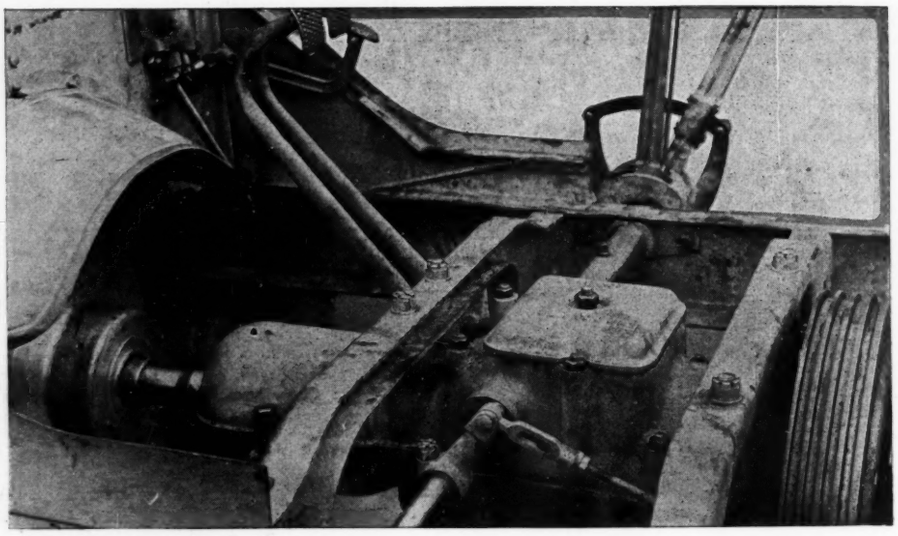
For trucks with magneto ignition only, and these constitute the great majority of the Italian fleet, variable advance is to be preferred; but the amount of advance obtainable should be just sufficient to allow full advance to be given and maintained when the motor has warmed up and is in good condition.

**Better Brakes Necessary**

As all driving is done with the accelerator pedal, there is no necessity in army work for throttle control on the steering wheel. All that is required is an easily-operated idling adjustment either on the carbureter or on the dash, for it is not often that a cold motor will start on the minimum gas required to keep it running when once warmed. The abolition of the throttle lever is one little step towards simplification. One technical report which dealt largely with American chassis used on ambulance service in Italy suggested an additional air control so as to allow pure air to be aspired when descending long hills. This is no doubt useful in the hands of a good driver, but the real reason for the proposal was that the brakes on these cars were not efficient. The correct remedy would have been to improve the brakes.

**There should be an accessible and easily demountable filter on the gasoline line near the carbureter. A cock just behind the filter is an advantage, for it allows the flow to be shut off with a minimum of labor. These remarks apply particularly to cars on winter service, for a common way of keeping the water from freezing is to cover the radiator and hood, shut off the gasoline and empty the float chamber, then place a small kerosene lamp under the hood.**

Practically all Italian cars and trucks are fitted with pressure feed for fuel, the pressure being taken from the exhaust or in some cases obtained from an air-pump. The system is very unsatisfactory. Gravity would be better, but it was not always an easy matter to locate the tank in a high position to give a flow on hills. Certainly the vacuum feed would have been a great improvement. Where exhaust pressure was used trouble was experienced in sooting and choking of the pressure valve, also by



*Here is a rear wheel brake adjustment correctly placed under the floor boards*

reason of the condensation of water in the manifold, this water being passed through the air line into the tank.

In one set of Fiat cars, with pressure-fed tank under the seat, and gasoline supply drawn from the base of the tank, endless trouble was experienced with water. Within an hour of everything, including tank, being taken down, cleaned and dried, water would be found in the carbureter. This was inevitable, for condensation from the manifold caused the water to travel to the tank, and it came out at the lowest point and went to the carbureter. It could have been cured by bringing the outlet pipe through the top of the tank, instead of the base, using this old outlet as a water drain-off. But as no copper pipe was immediately available at the front, the connection to the manifold was broken and pressure put on the tank by means of an ordinary tire pump mounted vertically by the driver's side. A single stroke of the pump about every half hour was quite sufficient to maintain pressure.

It was often found that the auxiliary hand pump on the dash was quite insufficient to maintain pressure if the exhaust pressure or air pump failed. Thus quite a number of drivers fitted up a tire pump on the dash and got all the pressure they required in two or three strokes. It is important that there should be a cock on the gasoline line just back of the carbureter, so that it is not necessary to crawl under the car to stop the flow if the line has to be broken. On one of the Fiats mentioned above as giving trouble owing to condensation and water in the carbureter, there was no such tap. Thus, with the tank under the seat and gravity flow while on the level, it was necessary to crawl under to shut off the flow.

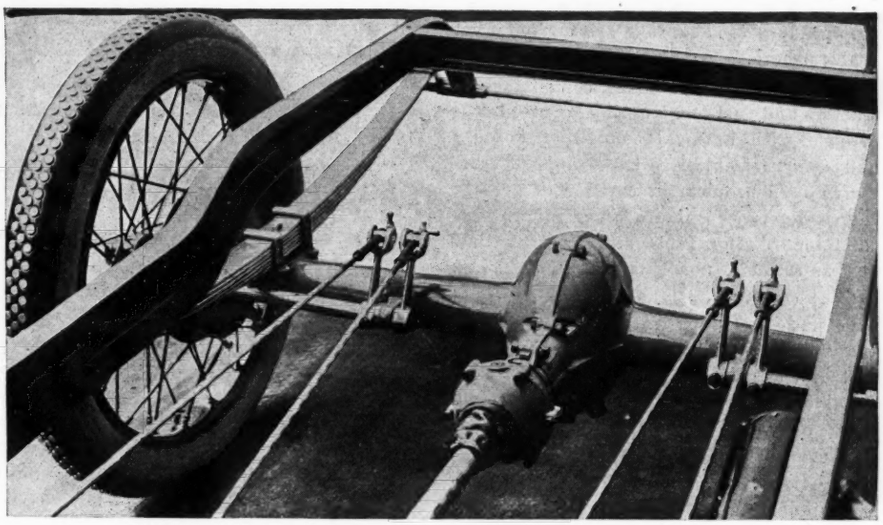
One incident in this connection may be mentioned. The driver was crossing a partially wrecked bridge under shell fire when the carbureter choked owing to the presence of water. The driver, who was alone, had first of all to get under the car, then take down the gasoline line, clean out the filter and jet, and after assembling to again crawl under the car. The car was in view of the enemy all the time, shells were falling around, and other drivers, who had no desire to loiter at such a spot were not complimentary to the man who had partially blocked the bridge. It is not necessary to repeat what the driver said about the designer of that feature on the car.

**Carbureter Improvements**

Although much is said in military circles about the advantage of carbureters employing alternative fuels, no necessity for this was seen on the front, there always being a plentiful supply of gasoline of fairly good quality. The only complaint that could be made against it was the presence of a certain amount of water in the bottom of the cans. In one case a 12-gal. can, properly sealed and coming direct from the refinery, was emptied into a tank and found to be pure water. In all cases, one could be reasonably sure of finding a quarter to half a pint of water in half the cans opened. This naturally suggests a tank which can very easily be dismounted, whether it be built in the body or under pressure at the rear.

The accident mentioned above happened to an American car fitted with an English-built body. It was impossible to get the tank out without pulling the body to pieces; consequently the car was off the road 2 days, during which time the driver was washing out the tank with fresh supplies of gasoline. An Italian car had somewhat similar trouble at the same time, but as the body had been correctly designed, and the filler made big enough to allow the passage of a man's hand, everything was dismounted, dried and replaced within an hour.

The trouble with American carbureters was their liability to get out of adjustment. On the other hand, they were very easy to adjust by any driver who would take the trouble to study them. They also



*This brake adjustment is wrong for the parts are always working in mud*

had the advantage of giving much easier starting from cold than the majority of the European carbureters. On one the adjustable main jet in the base of the carbureter was liable to work loose, allowing an excessive amount of gasoline to pass through. Being below the level of the sub-frame, it was not a very easy matter to tighten up the lock nut, thus the mixture would gradually become richer, causing excessive consumption, until finally real trouble would develop. Frequently the driver did not notice that his mixture was becoming richer until it had reached such a point that he could no longer run.

**Favor European Carbureters**

Because of this tendency to get out of adjustment, European military engine authorities have manifested their dislike towards several makes of American carbureters, and in placing some recent important contracts have insisted on the adoption of a European carbureter, which, once set, cannot be adjusted except by the changing of the jets—and the driver is not allowed to have spare jets. On the great majority of Italian vehicles, the whole of the air is drawn from the valve stem chamber, and the carbureter being bolted direct into the cylinder casting, or with a very short intake pipe, vigorous heating is secured. No cases came to light in which the heat was too great under the hood, although in some of their colonial campaigns this difficulty had been met with and overcome by putting the carbureter right outside the hood, usually to the rear of the dash.

Among some of the minor features which often assume considerable importance on active service, may be mentioned an easily dismountable float chamber cover. On all the American engines a screwdriver has to be used to take the cover off; on some of the Fiats the cover screws down, but it is so near the cylinder casting that there is insufficient clearance to pull it out. Thus the entire carbureter has to be taken down by unscrewing three nuts which are rather inaccessible except with a special wrench. The Claudel is ideal in this respect, for the cover is held by spring-controlled balls, and can be taken off, removing the float and needle in a second, without the use of any tool. There should be an accessible and easily dismountable filter on the gasoline line near the carbureter. A cock just behind the filter is an advantage, for it allows the flow to be shut off with a minimum of labor. These remarks apply particularly to cars on winter service, for a common way of keeping the water from freezing is to cover the radiator and hood, shut off the gasoline and empty the float chamber, then place a small kerosene lamp under the hood. Kerosene is generally easily obtainable, and the system is very efficient, easy of application and presents no danger—providing these requirements have been fulfilled by the designer.

Lighting sets on cars and trucks working at the front present some difficulties and peculiarities. An independent electric lighting dynamo, with head, side, tail and inspection lamps, was very satisfactory, provided the set had been built in with the chassis, and not put on as an afterthought. In this latter case the work was rarely done satisfactorily; either the dynamo was exposed to dirt, or the belt could not be tensioned, or the whole was inaccessible, or the wiring was not properly incased and free from friction. Given these disadvantages and a mediocre driver, trouble was bound to develop.

It is probably on this account that the English authorities insist on two sets—electricity and oil. Unfortunately there are comparatively few European cars with a correctly-designed and properly-fitted lighting set. Most of them are additions. Further, for truck work it seems unnecessary expense to fit a dynamo and electric lamps. The Italians use a self-contained acetylene generator and headlight nearly always mounted on the dash, and also side lamps. The dash position has many advantages, for it enables the driver or mechanic to attend to the light without leaving their seats, also to screen the light as they pass into sections of the country where lights could be seen by the enemy. There is the additional advantage that the lamp is protected against the minor collisions so common in night driving.

Delco lighting sets on Buicks proved very satisfactory. The writer can speak from personal knowledge of half a dozen cars which since August, 1916, to the present date have been behind the trenches and ahead of the artillery and never under cover, even for repairs. Most of the drivers had very little mechanical knowledge and it was known that some had run their cars for twelve months without oiling or giving any attention to the generator. Yet no trouble developed on these cars.

The cars with which the writer was connected were working so near the front that for the first and last five or six miles of every out and home trip no lights whatsoever could be shown. Further away a dim light could be shown, then one headlight with half the area of the glass blackened out. Oil side lamps were carried, but never used or kept in condition to be used. Tail lights were found useless and never employed except on a few staff cars. There is absolutely no need for a tail lamp on war service. The dimmers on Buicks gave too bright a light for general use near the front.

**Special Lamps Used**

Nearly all the Buick drivers rigged up a special lamp for work close to the trenches or on roads in view of the enemy. A Colgate's shaving soap tube was obtained and its bottom cut so that it opened at an angle of about 45 degrees. The small inspection lamp was secured inside this, the cable being brought over or through the dash and alongside the hood, and this improvised lamp fastened by adhesive tape to the extreme end of the left-hand dumb iron. This threw a ray of light on the ground just ahead of the left-hand wheel, but no light went upwards. Although regulations were that no light of any kind should be shown in the zone of operations, the military police would pass this improvised lamp until the car had got within three miles of the front line trenches.

**(To be concluded)**

**In one set of Fiat cars, with pressure-fed tank under the seat, and gasoline supply drawn from the base of the tank, endless trouble was experienced with water. Within an hour of everything, including tank, being taken down, cleaned and dried, water would be found in the carbureter. This was inevitable, for condensation from the manifold caused the water to travel to the tank, and it came out at the lowest point and went to the carbureter. It could have been cured by bringing the outlet pipe through the top of the tank, instead of the base, using this old outlet as a water drain-off.**

# Motor Corps Is Planned

## Need of at Least 40,000 Skilled Drivers Confronts Army of 1,000,000

### Receipt of Applications Indicates Draft Is Unnecessary Here

WASHINGTON, May 1.—Plans for motor and motorcycle corps for the new army of 1,000,000 men practically have been completed by army officers, members of the S. A. E. and others working under the direction of Howard E. Coffin, chairman of the advisory committee of the Council of National Defense, and the Motor Transport Committee, headed by Coker F. Clarkson. The War Department is to ask for bids, as already reported in MOTOR AGE, for 40,000 motor trucks. This means that at least that number of skilled drivers, and a very considerable number of mechanics, instructors and helpers, will be needed.

These will not have to be drafted, judging by applications which are pouring into the offices of the National Defense Council from all sections of the country. At the offices of Mr. Coffin it is stated no difficulty is anticipated in getting all the motor experts necessary. While these chauffeurs, mechanics, helpers and instructors will be accepted because of their fitness and training, once their services are accepted they will become enlisted men of the army, this step being necessary in order that the Government may avail themselves of their help.

### PURCHASING AGENTS ORGANIZE

Detroit, April 27—The Detroit section of the National Association of Purchasing Agents was organized last night and C. A. Woodruff, purchasing agent for the Chalmers Motor Co., was appointed chairman of the temporary governing committee. The other men on the temporary governing board are: J. H. Main, Cadillac Motor Car Co.; T. H. Maisonville, Timken-Detroit Axle Co.; H. H. Viot, Continental Motors Corps.; George Berridge, Park-Davis Co.; T. P. Thornton, Detroit Steel Products Co.; H. Hawk, Willys-Overland Co.

### TRACTOR TO SOLVE FOOD SUPPLY

Minneapolis, Minn., May 1—Special telegram—The importance of this city and section in the solution of the future world's food supply problem was emphasized by H. L. Horning, addressing seventy-five members of Minneapolis Section, Society of Automotive Engineers, because here is concentrated the center of food supply of the United States and tractor industry. He said the tractor is the solution of food problem. Difficulty now is to get materials and labor for the industry. To increase the supply of tractors is the call to-day and to any good tractors we may land abroad to help produce food there is solving our food problem here.

As chairman of the S.A.E. committees on tractors and fuel Mr. Horning reported conference with national council of defense and its agreement as to importance of tractor in food problem as capable of greatly increasing the crop. He reported progress in standardizing fuels and probable low cost as result of new processes of cracking.

That the four-cycle, four-stroke vertical type with early application of kerosene is the ultimate type of tractor engine was the gist of the morning papers. It should be capable of delivering 16 to 40 hp. continuously without distress at full load or over at from 750 to 1230 revolutions.

Questions by members brought out the importance of understanding combustion chamber in developing the engine and determining correct compression; that the lightest campatible lubricating oil should be used, and that constant level splash is best lubricating system, force feed having possibilities also.

### NEW INTERESTS IN REGAL

Detroit, April 30—The Lambert interests in the Regal Motor Car Co. have, in great part, changed hands. John Lambert and Charles Lambert have sold their interests in the company, though Bert Lambert retains an interest and will remain a director of the company. The Lambert interest has been purchased by St. Paul, Minn., capitalists who are represented by Frank H. Shaw, now treasurer of the Regal company. Mr. Shaw was formerly in the banking business in St. Paul. F. W. Haines remains as president of the company. H. H. Emmons has resigned as secretary and joined the United States Navy. He is succeeded by M. T. Boden who was formerly the treasurer of the company. Other officials remain as heretofore.

The Regal company is now producing ten to twelve cars daily and with the new working capital expects to attain a capacity of twenty cars per day in the near future.

### LATE PRICE CHANGES

Toledo, Ohio, May 1—Special telegram—The Overland big four has been advanced to $895; the four roadster to $880; the light six to $1,025; the six roadster to $1,010, effective to-day.

Detroit, May 1—Special telegram—The Saxon six touring and six chummy roadster are now $935. Other prices remain the same.

Detroit, May 30—The American six five-passenger touring car has been advanced from $1,285 to $1,375.

New York, May 1—Prices for the Kent car have advanced from $985 to $1,085, effective April 15.

New York, May 1—Delion and Hardman tires have been advanced in price about 15 per cent.

# Needs Armored Cars

## Munitions Bureau to Buy Tanks and Caterpillars Such as Europe Uses

### British and French Experience to Help Army Prepare Motors

WASHINGTON, May 1—The United States army needs, and it is now preparing to buy, through the munitions bureau of the Council of National Defense, large numbers of armored cars, tanks, caterpillars, etc., such as are being used with good effect in Europe. Specially built trucks, probably the four-wheel-drive machines, for use in the transportation of heavy army pieces in the field, have been planned and their construction decided upon. The problem which will face the army heads within the next six or eight months, when close to 1,000,000 men will be encamped and put through a rigorous course of training in the handling of field artillery pieces and other cumbersome army equipment, has not been overlooked.

The experiences of Great Britain and France with heavy motor apparatus are being drawn upon in plans for the best possible utilization of these factors by the War Department. These plans, on which experts of the army, officers assigned for duty in connection with the Council of National Defense heads are engaged, include the adaptation of motor trucks, tanks, armored cars of different designs, etc., to the varied uses and conditions which will confront the army once it is in the field.

### STEWART-WARNER EARNINGS

Chicago, May 1—Profits for the first quarter of 1917 as shown by the statement issued by the Stewart-Warner Speedometer Corp. were $542,000 as against $571,000 for the first quarter of 1916. This year it has been necessary to set up a heavy reserve to cover the increase in Federal Income tax, and in general. The management has aimed to be conservative. Business in March was excellent, this having been the largest month in the history of the corporation. The enlarged Chicago plant and the new Beloit, Wis., factory will give the corporation greater facilities for handling this year's and future business.

### FILL USED CAR SHOW SPACE

Chicago, April 30—A motley and numerous representation of used cars of virtually every make sold in Chicago will be displayed at the "great central market used car show," which appears at the Coliseum May 5-13. Only one of the thirty-eight spaces for used cars remained unallotted last night. While distributors of thirty-four makes of pleasure cars and

three trucks appear on the list, it is probable this number will be greatly augmented, as the dealers are permitted to display cars which bear the names of factories other than those they repreesnt.

The following passenger cars will be represented: Allen, Baker electric, Buick, Chalmers, Chandler, Cole, Detroit electric, Dodge, Empire, Ford, Franklin, Grant, Hal, Haynes, Hudson, Hupmobile, Jordan, King, Kissel, Marmon, Maxwell, Mitchell, Moline-Knight, Oakland, Overland, Owen Magnetic, Packard, Paige, Peerless, Pierce-Arrow, Reo, Studebaker, Velie and Winton.

Commercial vehicles will be displayed by the Dearborn, Maxfer and Smith Form-a-Truck companies, and several accessory exhibits also will be there. Arrangements have been made for handling even larger crowds than those which attended the national exhibit of new cars in January.

### IGNITION SYSTEMS; THEIR USE

Philadelphia, April 26—Of a total of 108 manufacturers of motor cars, eighty-six are to-day using battery ignition systems and twenty-two are using magnetos, many of the latter using dual systems which are virtually semi-battery ignition systems.

In making this statement before the Philadelphia Section of the Society of Automotive Engineers, H. E. Rice, sales manager of the Atwater Kent Mfg. Co., also laid stress on the need for standardization in certain parts of such equipment, which he stated is the least complicated and the easiest to maintain of all ignition systems. Rice's paper was entitled "Problems in Ignition Development."

In reviewing the development of ignition apparatus, Rice pointed out that ignition equipment represents only about 1 per cent of the total cost of the complete car but is 100 per cent important to the operation of the car.

"Battery ignition," he said, "may be divided into two general types and classified as open-circuit and closed-circuit systems. In each system the elements are almost identical, consisting of a combination low-tension circuit breaking and timing device, a transformer coil with primary and secondary windings and a distributing device for connecting each spark plug in its proper order to the high tension winding of the coil.

"The open-circuit contact-maker is so designed as to close the circuit of the transformer coil momentarily for each spark, the time interval being uniform at all engine speeds. The time during which the primary current flows through the coil is approximately 0.033 of a second for each spark. The current flow for this brief instant is about 4½ amp., but the time is so short that the energy consumed is almost negligible—a six-cylinder system requires less than 0.6 amp. at highest engine speed, and dry cells are economically used for current.

"In the closed circuit system the same elements are used except that the contact-maker is operated by direct cam action and the electrical windings are proportioned differently. The form of the contact-maker has been evolved from the magneto and consists of a simple arm carrying a contact point and controlled by a spring to bring the contacts together. The contacts are separated by the action of the cam on the timer shaft.

"By reason of this simple cam action the circuit is closed for a longer time interval than with the open-circuit system, and the contact varies with the speed—a long contact at low speed becoming shorter as the speed increases.

"This is a much simpler type of contact maker than required by the open circuit system, but it takes more current should the circuit be left open. With the motor closed, the battery will be discharged at a rate limited only by the resistance of the primary circuit."

# Cars Must Keep Moving

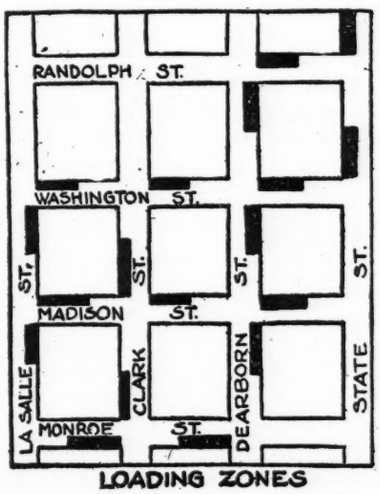
## Chicago Loop Cleared of Standing Vehicles by New City Regulation

### During Rush Hours Vehicles Cannot Remain on Car Lines

CHICAGO, May 1—Chicago's loop district came under what might appropriately be termed "martial law" this morning at 7 o'clock and remained so until 10 so far as motorists were concerned. There will be another period this afternoon from 4 until 7 o'clock and every week day thereafter during these hours. Reason: The going into effect of the new non-parking law which makes stopping of any vehicle on a car line street within the loop during the hours specified, except to take on or discharge its load, a misdemeanor.

From three to a half dozen mounted police in each block kept close scrutiny on all vehicular traffic. If a motorist stopped his car and started to leave it he was gently but firmly reminded that the new ruling was in effect. Occasionally a motor car was to be seen parked at the curb in front of some office building, and around it were two or three mounted police. Pedestrians paused and waited to see what action the police took with the car owner when he appeared. After a reasonable wait the police would dispatch one of their members to the police department with the license number of the parked car to get the name of the owner. Then the owner was sought out in his office and told he had broken the law and that his car must be moved.

Excuses were varied. One car owner, whose machine had been in front of a building for 2½ hrs. disclaimed knowledge of how it got there, saying he supposed it was in the garage. The police were inclined to be lenient today because the ruling was not understood by the public. Frequently one heard a car operator or owner hail a police officer with the query, "Where can I park?"



LOADING ZONES

According to the new ruling a car may be parked on streets having no car line for a period of 30 min., but as there is only one street—Jackson—which has no car line at all, and three or four other places where there is one block with no car line, those in the habit of parking their cars in the loop found it unpleasant this morning, for most of the available places where they could leave their car for even 30 min. were taken early. In the loading zones shown in the illustration, which are designed to give room for two street cars to load and unload at one time, all other vehicular traffic must proceed in single file as near the curb as possible and stop only when told to do so by the traffic officer. The ruling applies to all vehicular traffic, and this traffic is not allowed on the street car tracks unless it is necessary to pull on the tracks to pass another vehicle that may be loading or unloading at the curb. However, as soon as such vehicle is passed the other vehicle must pull off the car tracks to hug the curb.

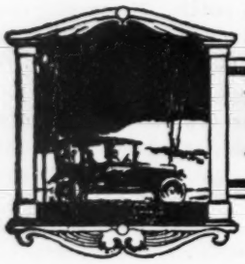
### LOCOMOBILE STATEMENT

New York, May 1—Special telegram—Locomobile's statement of March 31 shows cash and debts receivable as $1,110,632; profit and loss surplus, $1,585,903; total assets and liabilities, $15,218,431.

### 120 SALES AT MILWAUKEE SHOW

Milwaukee, Wis., April 28—The results of the first annual Used Car Congress, April 20-26, more than justified the expense incurred and induced the most serious consideration of the idea of holding a similar exposition in this city at least twice a year, and probably four times a year, according to the board of managers of the Milwaukee Automobile Dealers, Inc. It is estimated that more than 175 cars were actually sold as the result of the show, and of this number 120 sales were made on the floor of the Auditorium.

Every car shown in the Auditorium first underwent a thorough mechanical inspection. Each was required to bear the inspection committee's tag before passing the gate. All cars also bore a large tag showing the name, model, year, motor number, and the resale price. In every case of a sale, the seller used a uniform order blank provided by the M.A.D. This was a conditional sales contract which gave the purchaser the option of returning the car within seven days if it did not prove satisfactory. Time payments also were provided for, at such terms as the buyer and seller agreed upon in the individual case. The highest-priced sale was that of a 1916 Cole 8 at $1,375. Next was a 1915 Marmon at $1,300. The average was over $475.



# EDITORIAL PERSPECTIVES

## Millions for War Motors

THE movement through Government sources, and by organization of motorists, dealers and by states themselves, to get a complete census of all cars available is a very laudatory one, and one which may be extremely valuable in case of emergency. Certainly we should know what used machines we can have, should the emergency arise. England had the men, but not the machines, and had to have some means of moving them. America has not the men and does not need at this time to rely on private or commercial vehicles.

IT HAS been said many times that the motor vehicle was the salvation of Paris, and this is true. By pressing into instant service every vehicle that could be obtained by organizing a transport over night practically, the German tide was turned almost at the city gates of Paris, but had Paris or the French army had the proper complete transport system in shape and in operation, in all probability Paris would never have had to be saved by such last-minute methods.

THAT Uncle Sam is planning to utilize every motor resource of the country in the forceful prosecution of the war at last seems to be definitely shown by the action this week of the Appropriations Committee of the House of Representatives in reporting out a bill which provides $160,000,000 for war transportation purpose alone, in addition to which nearly $4,000,000 is appropriated for armored motor cars. In the war transportation appropriation, one of the chief items is the allowance for motor cars and trucks.

THE Government's realization of the need of roads for national defense is indicated in the item of more than $5,500,000 for roads, wharves and drainage and it is anticipated that the major portion of this will be utilized in road section is mentioned specifically in the $11,000,000 appropriation provided for aviation. It is understood that this appropriation has the backing of the general staff of the army and navy, and it is hoped that Congress as a whole will see fit to make the bill a law within a very short time.

## Highways for Defense

WITH the coming of war the country has awakened to the value of good highways as a means of defense and during the last few weeks good roads agitation has kept pace with the growing realization that motor roads would be a tremendous factor in the military strength of the United States.

GOOD roads meetings are being called in most of the states and the people are looking for action by their legislature for the appropriations for building and maintaining thoroughfares which would have a military significance. The Illinois campaign for a $60,000,000 state-wide bond issue and the acceptance by the motoring public of the doubling of the state license fee is only one of the instances of this movement. Wisconsin's new road measure, in which an action similar to that of Illinois is being taken, is another instance. Among the southern states waking up to the good road necessity, Alabama is the foremost. Senator John H. Bankhead of the Senate committee on postoffices and post roads sums up the need of roads as follows:

"It may be that I can be of the most service to my country, whether in war or in peace, by promoting in every possible way the building of better roads."

NEW JERSEY is raising $15,000,000 by the adoption of a one-mill tax for state road purposes, which is to be expended under the direct supervision of General George W. Goethals, the Panama Canal builder, who has accepted the post of state highway engineer. In California the first public utterance of Governor William D. Stephens calls for "federal, state and county co-operation in the construction of military roads for coast protection and for defense in other ways."

## Must Train Military Drivers

MOTORISTS whose patriotism and willingness to do their bit in the service of their country exceeds their knowledge of actual war conditions and military needs have had the feeling that the government has not utilized its resources as quickly as it should by the fact that it has not yet made definite arrangements for the service of passenger car and truck drivers who are civilians and has not seemingly made any special effort toward enrolling corps of drivers for military service. As pointed out in MOTOR AGE last week, the country will have motor trucks for military purposes more rapidly than proficient drivers can be trained.

IT IS this very fact that has been the cause of the seeming delay in making provision for enrolling and training drivers. Until last week, when the selective draft bill was made a law, the machinery for such enrollment could not be arranged. Doubtless the military authorities and the civilian boards connected therewith, such as the Motor Transport Division of the Council of National Defense, are arranging for just such a move as the motorists at large have been awaiting, but so far there has not yet been established any real machinery for recruiting and training men to become competent drivers of military vehicles.

AT FIRST glance one would naturally assume that in the organization of motor transports for military work one of the smallest troubles would be to obtain an adequate supply of reliable drivers. But it proved a hard task in France and England and the indications are that there will be difficulty in America. There are good reasons for this.

UNCOMPLIMENTARY as it may sound, the average driver of a passenger car is not a very good truck driver, particularly in emergencies. The truck driver ordinarily operates on city streets, where he has had little experience with serious road difficulties and never is very far from skilled help. Also, with some few exceptions, truck drivers are not amenable to military regulations and restrictions to the extent that they would have to become in service, and the volunteer passenger driver who has been accustomed to follow his own sweet will in the care and guidance of his car perhaps is even less so.

# Work of Council of National Defense

## What the Organization Is and What It Does

WASHINGTON, D. C., May 1—The work of the Council of National Defense is so important and so little understood in these war days that the scope of the organization formed Aug. 29, 1916, means much more to the public to-day than at its formation. It is not generally understood that under the name of Council of National Defense there are really two organizations as follows:

1 There is the Council of National Defense, consisting of the Secretary of the War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce and the Secretary of Labor.

2 There is an Advisory Commission, consisting of seven civilians whose duty it is to advise the Council of National Defense as outlined in paragraph 1.

The Council of National Defense as established last August was formed for the co-ordination of industries and resources for the national security and welfare. The Council has to supervise and direct investigations and make recommendations to the president and the heads of executive departments as to the location of railroads with reference to the frontier of the United States so as to render possible concentration of troops and supplies for defense purposes, the co-ordination of military, industrial and commercial purposes in the location of extensive highways and railroads; the utilization of waterways; the mobilization of military and naval resources for defense; the increase of domestic production of articles and materials essential to the support of armies and of people during interruption of foreign commerce; the development of sea-going transportation; data as to amounts, location, method and means of production and availability of military supplies; the giving of information to producers and manufacturers as to the class of supplies needed by the military and other services of the government, the requirements relating thereto and the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation.

The Advisory Commission consists of seven who serve without compensation but are allowed expenses of travel and subsistance when attending meetings of the commission or engaged in investigations pertaining to its activities. The Advisory Commission is composed as follows: Chairman, Daniel Willard, having to do with transportation and communication; Howard E. Coffin, Hudson company, in charge of the committee on munitions and manufacturing, including standardization and industrial relations; Bernard M. Barouch, a New York capitalist, chairman of the committee in charge of raw materials, minerals and metals; Samuel Gompers, labor leader, chairman of the committee on labor, including conservation of health and welfare of workers; Julius Rosenwald of Sears Roebuck & Co., mail order house, chairman of committee on supplies, including food, clothing, etc.; Dr. Hollis Godfrey, chairman of the committee on scheme and research including engineering and education; Dr. Franklin H. Martin, chairman of the committee on medicine including general sanitation.

The Advisory Commission of the Council of National Defense has its headquarters in the Munsey Building here, from where all of its activities are directed. Only $200,000 has been appropriated to date for the Council of National Defense, but owing to there being much volunteer assistance given it is possible to accomplish great things with this small appropriation. Already much has been done as a result of the organization of this council and its advisory commission. Some of the accomplished activities are as follows:

A An industrial inventory of 27,000 large factories for military purposes, this work having been directed by Howard E. Coffin for the Naval Consulting Board but turned over to the Council of National Defense.

B The appointment of a Munitions Standards Board on which are several men connected with the manufacture of munitions as follows: Frank A. Scott, Cleveland, Ohio; W. H. Vandervoort, Moline, Ill.; E. A. Deeds, Dayton, Ohio, and others. All these men have had practical munition manufacturing experience during the last two years. All of them are devoting a good portion of their time to the work and have offices with the Council of National Defense, this city.

C The organization of the committee of the leading telephone and telegraph companies of the country, headed by Theodore N. Vail, of the American Telephone and Telegraph Co., to insure to the Government rapid and efficient telegraph and telephone service in the event of war.

D Mr. Baruch has for the council made large purchases of copper and other materials for the government at favorable prices.

E A medical section has been established to card-index qualified medical and surgical practitioners for the enlargement of the medical reserve corps, and the establishment of an organization for the standardization of hospital and medical supplies.

F A commercial economy board has been established to mobilize the commercial interests of the country for effective and economical distribution of commodities throughout the civilian population. A. W. Shaw, Chicago, heads this board, and is assisted by Edwin F. Gay of Harvard University and Wallace D. Simmons, St. Louis.

G A munitions board has been established.

H Robert C. Hoover has been made chairman of a committee on food supply and prices. Mr. Hoover has handled this work in Europe and is ideally qualified for it.

I A motor transport committee for emergency furnishing of motor trucks and motor cars has been appointed with Alfred Reeves, chairman, assisted by Coker F. Clarkson, A. G. Batchelder, Roderick Stephens and others.

The Council of National Defense already has accomplished much in co-ordinating the different industries, and each week finds it broadening out in its activities. It is serving as a connecting link between the various government departments and the industries. It is selecting the best men for different positions and bringing these to the attention of the government. Naturally the recommendations of the Advisory Commission with regard to civilians is seriously considered by the government departments. The Advisory Commission looks at all matters through the industrial eye. When a representative of the motor industry has to be appointed the recommendations naturally come thruogh the Advisory Commission which makes it a part of its duty to see that the man thus qualified are brought to the attention of the council for appointment.

### BIJUR INCREASES CAPITAL

Albany, N. Y., April 27—The Bijur Motor Lighting Co. has increased its capital from $650,000 to $2,000,000.

### SEIBERLING ON WAR COMMITTEE

Akron, Ohio, April 27—F. A. Seiberling, president of the Goodyear Tire & Rubber Co. and a director of the Chamber of Commerce of the United States, has been appointed chairman of a new wartime committee of the National Chamber. Mr. Seiberling's committee is to investigate and recommend a plan for taking care of the dependent families of soldiers engaged in the present war.

# How You Can Do Your Bit

## An Outline of What Is Expected of You if You Are a U. S. Volunteer

MANY thousands of car owners, mechanics and others directly connected with the motor car in some capacity are eager to do their bit for the country, but a large percentage of these are handicapped by lack of knowledge as to what branch of the service affords them the greatest opportunity for giving to their country that special knowledge which is theirs. Ultimately there will be a large force of mechanics, perhaps civilian car owners, needed, but the plans for enlisting men of this class are indefinite so far, although there will be work started along these lines in the very near future. Officials from Washington are expected in Chicago soon to begin recruiting truck drivers, but information will not be forthcoming for a week or more.

In the meantime it is the duty of every citizen to acquaint himself with the different branches of the national defense. The average man knows very little of the steps necessary to elist, of what is expected of him once he does enlist, or of what actual service means. It takes war brought right to our doors to bring this realization of its meaning to most of us. Many of the citizens of the disputed territories in Europe probably know what service means, even though they are not actively in it for they are in close contact. We in this country can and should know the details of enlistment. We should know that we can tell others, who, not because they are slackers, but because they have little if any knowledge of the procedure of enlistment in any branch of military or naval defense of our country, have not answered the country's call. Briefly, here are the qualifications one must possess to enlist in the various branches of the army or navy:

### THE ARMY

Citizens of the United States up to forty years old are eligible for enlistment in the infantry, artillery or cavalry. There is no minimum age, but those under eighteen must have the consent of their parents or guardian. They must be of good moral character, pass a rigid physical examination and show no defects in sight, hearing, arches, etc., in other words, be free from physical imperfections. They must enlist for the period of emergency, that is, until peace shall have been declared. Married men are not taken now, especially if they have dependents. The particular branch of the army which appeals most to the recruit is the one to which he is assigned.

After passing the physical examination, and by the way there are hundreds of applicants rejected in each recruiting office or station, the volunteer is sent to training barracks, where, for periods varying from a week to a month, he is instructed in military drills and training, after which he is assigned to some station where a regiment of cavalry, infantry or artillery is being brought to war strength. Here he undergoes further training and ultimately becomes an efficient soldier.

### UNITED STATES MARINES

Marines are not in the army, though they perform military duty. They belong to the naval service and perform the soldier duty in the navy. For this reason they are sometimes called "sea-soldiers." They are known as marines because they are members of the Marine Corps, an organization of 17,400 trained men whose special duty it is to protect the interests of the United States in any part of the world. They serve both on land and sea, at home and abroad. They are the first to land from the battleships; they precede the regular regiments of the army in landing on foreign shores. To enlist in the Marine Corps an applicant must be not less than 5 ft. 4 in. nor more than 6 ft. 1 in. in height; weigh not less than 128 lbs. nor more than 233 lbs. and be between the ages of 18 and 35 years. He must be unmarried and have no one dependent upon him for support. All enlistments are for four years.

The applicant must pass an examination to prove his intelligence and morality and be free from disease or bodily ailments. If he is accepted he is given training for about three months after which he is available for call to go to any part of the world to defend and protect the interests of the United States.

### THE NAVY

Male citizens sixteen to thirty-five years old, married, or unmarried, are eligible for enlistment in the navy, but those under eighteen must have the consent of parents or guardian. The period of enlistment is four years except for those between seventeen and eighteen, who are enlisted only for the period of their minority. The minimum height for a man of twenty-one is 5 ft., 4 in. and the minimum weight 128 lbs. A chest expansion of less than 2 in. in a minor and 2½ in. in an adult is sufficient cause for rejection. All enlisted men must be physically sound, have good eyesight and hearing.

Young men from seventeen to twenty-five, who are not skilled in any naval trade are enlisted as apprentice seamen. Immediately upon being sworn in at the recruiting station, they are sent, at government expense, to a naval training station, either at Norfolk, Va., Newport, R. I., Great Lakes, Ill., San Francisco, Cal., Portsmouth, N. H., or Washington, D. C. The first three weeks at the training station the recruit is put in a detention camp where he is kept under observation to make sure he has brought no contagious disease into the camp and at the same time is assigned to a company and drilled under a petty officer. After three weeks he goes to the main barracks, where the course of instruction is more extended. Drills, duty and study periods take up a part of each week day, but there is ample time for recreation and athletics. Reveille is sounded at 5 a.m. that all recruits may be mustered at 5:30 a.m. From then until 7 o'clock they clean their clothes and camp. Breakfast is over at 8 a.m. and from then until 3:15, except for dinner at noon, the time is given to drills, study and instruction. From 3:15 to 6 o'clock is devoted to athletics and amusement. Supper is at 6 o'clock and all are required to be in their hammocks at 9 o'clock. After the training is completed the recruit is advanced according to his earned rating and is then ready to be transferred to the ships of the navy.

### OFFICERS' RESERVE CORPS

Infantry, Cavalry, Artillery

Beginning May 8 training will start for 10,000 officers for the first half million troops of infantry, cavalry, field artillery, engineers' and coast artillery corps to be called to the colors, there being four camps, each of which will handle 2500 men. These camps will be located as follows:

Fort Benjamin Harrison, Ind., two camps under one command, one being for Ohio and one for Indiana and Kentucky.

Fort Sheridan, Ill., two camps under one command, one for Illinois and one for Michigan and Wisconsin.

Fort Snelling, Minn., one camp for Minnesota, Iowa, North Dakota, South Dakota and Nebraska.

Fort Riley, Kan., one camp for Missouri, Kansas, Colorado and Wyoming.

The object of these camps is the training and selection of officers for a full division and one additional cavalry regiment. The maximum number that can attend each camp is 2500. These will be divided into

fifteen infantry companies for the first month and all trained alike. At the beginning of the second month they will be organized into nine infantry companies, two cavalry troops, three artillery batteries and one engineer company for the remaining two months of training. After the training comes to an end officers will be selected for one regiment from each organization and the remainder will be appointed as additional reserve officers, if competent.

To be eligible one must be either a reserve officer of the infantry, cavalry, field artillery, coast artillery, engineer corps; member of the reserve officers training corps and over twenty years nine months old; a cadet of the same age; a graduate of military schools or a civilian between twenty years nine months and forty-four years of age. Also one must pass an examination as to character and sobriety, be of good repute in his community, be likely to command respect of officers and enlisted men and have adequate education. Preference will be given men of valuable military experience. All expenses incident to attendance will be borne by the government.

### OFFICERS' RESERVE CORPS
#### Aviation Section

To enter this branch of the national defense the applicant must pass a rigid examination as to his physical fitness and his mental and moral standing. He must be vouched for by three reputable citizens and furnish several letters of recommendation, all of which, together with the schools which he attended and his business experience are carefuly investigated by the chief signal officer's office in Washington. The physical test for this branch is perhaps the most rigid of any in either the army or navy and it is said that a commission of first lieutenant, which is the rank given those who pass, is the best recommendation a man can have of physical, moral and mental fitness. As soon as the applicant is accepted he is made a sergeant with a sergeant's pay of about $90 a month to sustain him during the three to six months of training, when he is given his commission as a first lieutenant and discharged subject to call when the country needs him.

If the applicant does not wish to enlist he may attend the course as a civilian at his own expense. He will be assigned to a school for instruction, which may be a government or civilian school, and when he becomes proficient he will be given his commission without further examination. It is the intention gradually to organize reserve aero squadrons in various parts of the country from the commissioned and enlisted reserve personnel.

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### 6,200 EMPLOYEES JOIN RED CROSS

Buffalo, N. Y., April 27—Last week 6200 employes and officials for the Pierce-Arrow Co. joined the American Red Cross. The soliciting of members added $6,600 to the Red Cross fund.

# Speedometer Makers Out

## Stewart-Warner Employees Demand Woman in Enlisted Man's Place Be Ousted

### Officials Close Plant Until Adjustment Can Be Made

CHICAGO, May 1—Employers who attempt to fill with women places in factories vacant by reason of men enlisting may run afoul of labor troubles on the part of the other male employees, if the strike now on at the Stewart-Warner Speedometer Corp. plant may be taken as a criterion. An employee of the company resigned the day the draft law was passed and the management placed a woman in his position. Fifteen employees of that department walked out and several other departments did likewise the following day. Women employees joined in the demand that women be given men's pay for men's work.

"We employ women in many departments," said Charles B. Smith, general manager, "and since the man who left did so to enlist it is likely that if a man were placed in his position he too would be called when the draft law becomes effective. We shall use women wherever they can do the work. We closed down the plant for a few days until some adjustment can be made, but we expect to be operating again before the week is over."

Three thousand employees are affected by the shutdown. Officials see no reason why they should accede to demands made that the woman put in the man's position be discharged. Stewart-Warner stock dropped from 79 to 75 to-day, although whether or not this was due to the strike is not traceable.

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### BATTERIES BY THE MILE

Chicago, April 30—An innovation in selling plans for electric cars will be put into effect in Chicago May 1, when Harry Salvet, owner of the Fashion Garage and newly-appointed Chicago distributor for the Milburn electric, begins a service to new Milburn owners on a mileage basis. Two models of passenger and a 750-lb. delivery wagon will be sold, all without batteries. Service stations will be maintained throughout the city where the car owner can exchange his discharged battery for a charged one on a payment of 5 cents per mile traveled on the old battery.

The electrics will have a hub odometer and the owner will be furnished with a slip which will show the mileage at the previous exchange. He will present this and be charged 5 cents per mile for the difference between the previous and present reading. Service stations will re-charge the batteries and for this and the service of changing will receive 48 per cent of the amount they collect from the owner.

Salvet believes this will eliminate much of the objection to high garage charges since the owner can keep his car wherever he likes at about one-fourth the cost of keeping it in an electric garage and having to pay a flat rate for garaging and charging the batteries. In other words, the car owner pays only for the amount of mileage he gets out of the battery. The batteries will drive the car about 65 miles on one charge.

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### TO SERVE THE COUNTRY

Edwin Denby, treasurer of the Denby Motor Truck Co., and ex-president of the Detroit Board of Commerce, has enlisted as a private in the marine corps.

George D. Wilcox, sales manager of the Commerce Motor Car Co., has been offered a captaincy in the reserve corps of the quartermaster's department of the United States Army.

James E. Morgan, secretary and treasurer of the Wallace C. Hood service bureau, has been assigned to the first division of the United States Navy and is in service on the battleship Iowa. H. G. Moesta, special representative of the bureau, has been transferred for service on United States steamship Columbia, which entered active service April 21 as flagship for the Atlantic submarine flotilla.

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### AT CURTISS AVIATION SCHOOL

Newport News, Va., April 26—Esten B. Koger, formerly identified with the Oakland and Cadillac racing teams on the coast, is now at the Curtiss Aviation School here taking a course in aviation and will qualify soon for an expert pilot's license in the Signal Enlisted Reserve Corps as a lieutenant in the aviation section. For the last three years Koger has been the eastern sales engineer for the Master Carburetor Corp. of Los Angeles and Detroit. He also has been with Hamley-King & Co., Oakland and National distributor for Los Angeles and Southern California.

Lawrence P. Schenck, formerly manager of the Mitchell branch in Philadelphia, is taking a course at the aviation school also and will take the tests for a commission in the reserve corps soon. Among the prominent Philadelphia motor car men here to qualify for commissions in the aviation section of the corps is H. W. French of the Studebaker; Frank A. Dickman, assistant sales manager for the Buick, and Sam Eckert of the Sun Oil Co. The school has seventy students, many of whom are motor car men from all parts of the country.

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### BRISCOE OFFERS SERVICES

Detroit, April 30—Frank Briscoe, who recently resigned from the Briscoe Motor Corp., has offered his services to Washington through the Society of Automotive Engineers and has been called East for a conference.

# Government Accepts Motor Co-operation

## Formation of Volunteer Companies in All the States Is Recommended

NEW YORK, April 27—The Government has accepted the offers of co-operation from the motor industry. The immediate formation of as many voluntary motor truck, passenger car and motorcycle companies as possible in all the states and particularly along the Atlantic, Gulf and Pacific coasts, as a measure of preparedness is recommended.

The Volunteer Motor Transport Committee will direct the mobilization. It consists of Alfred Reeves, National Automobile Chamber of Commerce, as chairman; A. G. Batchelder, American Automobile Association; Coker F. Clarkson, Society of Automotive Engineers; Edward H. Broadwell, Motor and Accessory Manufacturers; Roderick Stephens, Motor Truck Club of America; and Shelby A. Falor, Federation of American Motorcyclists. These men are under the Advisory Commission of the Council of National Defense.

A volunteer motor transport reserve will consist of a captain, a truck master, three assistant truck masters, a mechanic, two helpers, two cooks, a watchman and thirty-three chauffeurs. The men will have titles from sergeant first-class to corporals and privates and will have charge of an equipment of twenty-seven cargo trucks, preferably of the 1½- and 3-ton sizes, a repair and kitchen truck, two oil and gasoline supply trucks and a motor car and a light repair truck. The personnel may be increased by adding assistant chauffeurs and cooks when needed.

Motor car and motorcycle companies will be organized along similar lines. Three motor companies will constitute a battalion with a major in command. Volunteer companies will include the necessary officiers, drivers and mechanics and will be used, when needed, for quickly moving bodies of troops or supplies. Such service probably will be only for a day or two.

Headquarters of the Volunteer Transport Committee are at 7 East Forty-second street. It is co-operating in the recruiting of competent drivers and mechanics for the Enlisted Reserve Corps of the Quartermaster's Department under the direction of Gen. H. S. Sharpe and Col. Chauncey B. Baker of the Quartermaster's Corps at Washington.

Two distinct lines have been undertaken by the committee. The first is to assist the Departmental Quartermaster at Governor's Island, N. Y., in recruiting and examining about 1400 experienced motor truck men or motor car drivers in the three sections of the Department of the East who are needed at once to man forty motor truck companies that are to be organized by the Quartermaster General at Washington. The men include truck masters, chauffeurs and repair men. They are being enrolled in the Quartermaster Enlisted Reserve Corps for a period of four years. They will bear the title of sergeant, and when called into service the drivers will receive pay of $36 a month and clothing and lodging.

A local committee has been organized at Boston to assist the army headquarters for the Northeastern Department along similar lines. Another committee is being organized in Atlanta, Ga., to assist the Quartermaster's Office at Charleston, S. C., for the Southeastern Department, which was created recently.

The second line of work is to form volunteer motor companies. Representatives will be appointed in the largest city or cities in each state.

### CHALMERS CONTRIBUTES

Detroit, April 28—Workers in the plant of the Chalmers Motor Co. have contributed to the Detroit chapter of the American Red Cross what is equivalent to $34 from each department. Eighty per cent of the $1,887 given was received from the workmen.

### TRACTOR RELIEF ASKED

Kansas City, Mo., April 28—The Kansas City Tractor Club has sent the following telegram to H. D. Coffin, chairman of the Council of National Defense:

"Production of food stuff is being cut short owing to inability of manufacturers to secure raw material for manufacturing farm implements, farm tractors and other farm machinery. The Kansas City Tractor Club at special meeting to-day adopted resolutions urging council of national defense to put raw material for implement manufacture in same preferred classification with munitions."

While April and May are off seasons for tractor sales, the sales this year have continued, and demand far exceeds the supply. There are none to deliver for harvest work, and unless manufacture is speeded the demand for belt power for handling forage and other crops, threshing, putting into silos and so forth will not be met. There will be great difficulty meeting the demand for tractors for plowing immediately after harvest in July—and early plowing is the most important step in winter wheat production.

In the last few days great interest has been shown in the coming demonstration of tractors at Dodge City, May 2-4. There will be thirty-five or forty tractors in the demonstration.

### FOREIGN PATENTS UNCHANGED

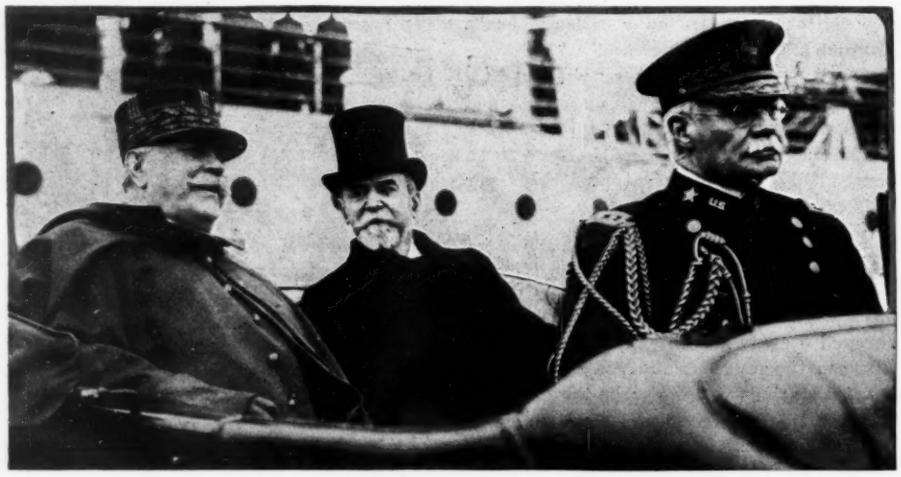
Washington, D. C., April 27—The status of patents held in this country by residents of foreign countries now at war with the United States, will remain unchanged for the present, according to Thomas Ewing, commissioner of patents.

The laws of the United States provide that in emergency the government can take over and make use of any patents. If the output of any manufactured article controlled by a patent is inadequate, the government can authorize the manufacture by another concern, the amount of damages to be adjusted later in the courts.

All the warring powers except Russia and Germany have agreed to keep in force patents already granted to enemies.

### TRUCK INFORMATION SECRET

Washington, D. C., April 27 — Truck manufacturers are manifesting a lively interest in the possibilities suggested by plans of the Quartermasters' Corps of the War Department to ask for bids about June 1 for trucks necessary to equip the army as fast as it is placed in the field under the reorganization plan. The specifications for 1½- and 3-ton trucks, as recently approved by the Secretary of War, are proving satisfactory to the manufacturers, judging by statements of officers in the purchasing department of the Corps. Major Charles B.



General Joffre, the Frenchman's "Papa," arrives at Washington This "close-up" view explains his general popularity here and elsewhere

Drake, technical assistant to Col. Chauncey M. Baker, chief purchasing officer, states that no exceptions have been taken by manufacturers to the new specifications to date. Asked if such exceptions would come to his attention if they were taken, Major Drake said they would.

Major Drake, however, said that censorship regulations prevent the giving out of the number or character of trucks being ordered, as this information would come within the scope of that which it is considered would furnish detailed statistics of army activities to the enemy.

### MAKERS PROTEST TAXES

Washington, D. C., May 1—Special telegram—Ray Chapin of the Hudson Motor Car Co.; Alvin McCaulay of the Packard company and other representatives of motor car factories are here to enter a vigorous protest against a motor car tax of 5 per cent of gross income on all factories.

The contention of Chairman Kitchin of the Ways and Means committee is that the manufacturers can pass this tax along to the consumers. This representatives of the factories deny.

Representatives of the motor industry also are protesting against a suggested increase of the excess profits tax from 8 to 16 per cent, if such increase also is to apply to motor car manufacturers.

It is estimated that the 5 per cent gross income tax would bring in $75,000,000.

### DEALERS ENCOURAGE GARDENS

Denver, Colo., April 25 — The national preparedness program received special recognition in Denver to-day by the Car Dealer's Division of the Automobile Trades Association of Colorado in the form of an official Thrift Garden Day. Twenty-six dealers took part, closing their places of business entirely or in part and giving themselves and their employees a chance to devote the day to making gardens.

### HINKLEY HEADS DETROIT SECTION

Detroit, April 27—Carl C. Hinkley, production manager and vice-president of the Chalmers Motor Co., has been selected to head the Society of Automotive Engineers for the coming administration. Mr. Hinkley has been especially prominent in the S. A. E. for his activities for increasing its membership. In the recent campaign conducted this month to secure 1000 new members, he volunteered at the start to enlist 100 new members himself and up to date has secured more than sixty signatures.

### PULLEN WITH PACIFIC CHEVROLET

Detroit, April 30—Eddie Pullen, the racing driver, has been appointed technical expert of the Pacific coast Chevrolet factory. He will travel the entire territory supplied by that plant and supervise the service of Chevrolet dealers.

# $160,000,000 for War Transportation

## House Committee Reports Out Bill With $3,900,000 for Armored Motor Cars

WASHINGTON, D. C., April 30—Special telegram—The house appropriations committee has reported out a bill that provides $160,000,000 for war transportation purposes alone.

In addition $3,900,000 is appropriated for armored motor cars.

Under this bill $2,699,485,291.18 is provided for the new army for the fiscal year ending June 30, 1918. Out of this $160,000,000 is set aside for transportation purposes alone. From it will come the principal allowances for motor cars and trucks. The bill appropriates $760,000 for anti-aircraft guns and $1,640,000 for ammunition for them. That special attention is to be given the matter of military roads by the War Department is indicated by an item for roads, walks, wharves and drainage alone of $5,539,965. Naturally, the greater part of this would be used for roads.

For transportation and recruiting of the marine corps $1,731,600 is provided. At the same time $9,000,000 is made available for the immediate purchase and equipment of sites for the permanent establishment of aviation schools, aviation posts and experimental aviation stations and proving grounds. Not more of this sum is to be used in purchasing land. This would mean that an immediate expenditure of $6,500,000 is contemplated for all the essentials of aviation schools and posts other than land.

The sum of $47,267,766 is appropriated to the office of the chief signal officer and $43,450,000 is set aside for the purchase, manufacture, maintenance, operation and repair of airships and other aerial machines and so on and other accessories necessary in the aviation section. Provision is made for the purchase, maintenance and so on of motor-propelled passenger and equipment-carrying vehicles for the aviation section in addition to the amounts provided in the bill for aviation activities in the army.

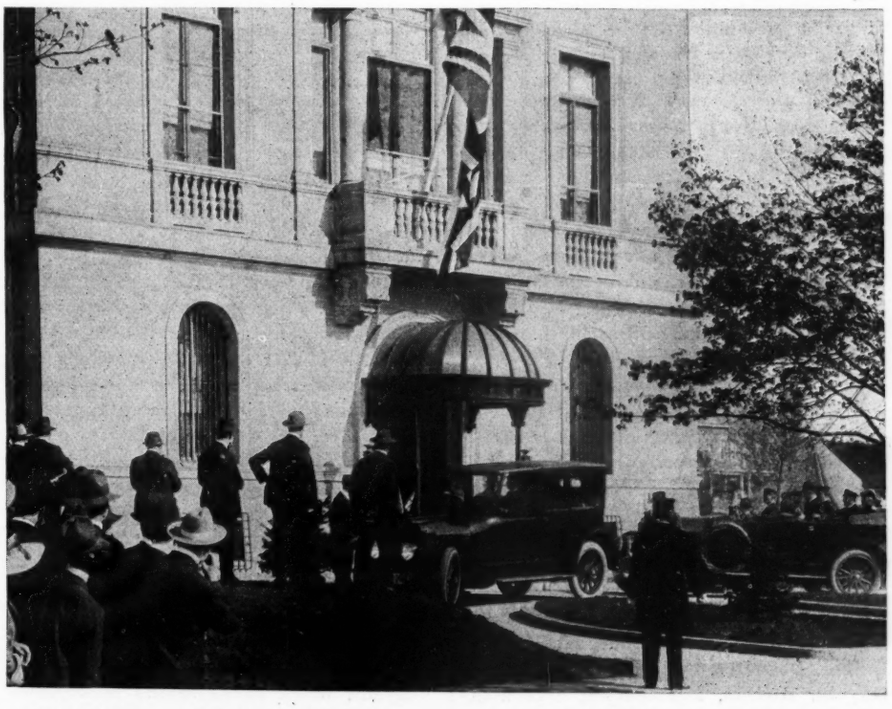
The sum of $11,000,000 is provided for aviation in the navy.

Numerous small items for motor-propelled vehicles also are included in the bill.

### DUNHAM ON TRACTOR BOARD

Washington, D. C., April 28—George W. Dunham, president of the Society of Automotive Engineers, has been appointed a member of the Tractor Board of the Ordnance Department. The board will be concerned with the application of different tractor types of apparatus to the movement of large guns such as howitzers.

Mr. Dunham has been in the motor industry since 1901. He has been chief engineer of the Olds Motor Works and the Hudson Motor Car Co. and vice-president of the Chalmers Motor Car Co.



England's foreign minister, Balfour, arrives at Washington A fleet of White cars took the party to the White House

One of the avenues in which the Lyons trade fair was held during 15 days of March

Many American cars were represented as was a large number of foreign car manufacturers

# U. S. Cars at Lyons Trade Fair

## French Exhibition Finds American Products Conspicuous — Rivals Leipzig Show

LYONS, France, March 20—American motor car manufacturers have reason to be proud of the position they occupy in the Trade Fair which opened here to-day with very little ceremony, after a postponement of one week, owing to weather conditions having upset traffic arrangements. Many of the stands were not finished and a number of the American exhibits had failed to arrive, but this was due to the delays in transportation and will be remedied in two or three days. The exhibition will remain open fifteen days.

In the motor car section there are exactly 100 exhibitors, though some of these occupy several stands and many of the agents represent several firms. Right at the head of this section is the official American stand, where Consul John E. Jones has on hand a big selection of catalogs and samples and is kept busy all day long answering inquiries from would-be purchasers. American cars and trucks to be found in the fair comprise Maxwell, Overland, Federal, United, Detroiter, Scripps-Booth, Pullman, Haynes, Hudson, and Sterling. In addition Bowser, Goodrich and Goodyear have big stands. Other American car manufacturers are represented by Gaston, Williams & Wigmore and the Butterosi Syndicate, but do not have cars or trucks on exhibit.

**Peculiar Attitude Seen**

The attitude of the French motor trade towards the fair is somewhat peculiar. The Chambre Syndicale de l'Automobile, the most important manufacturers' association in France, sent out a semi-official intimation that motor cars were not to be shown at the Lyons fair. Evidently this was done with a view to removing any possible competitor to the Paris Automobile Salon, intended to be re-established after the war. This notice was sent to British makers, who evidently took it to heart, for not a single English car, bicycle or motorcycle is represented at the exhibition. The French makers, however, have appreciated this piece of advice at its true value, the only absentees who could have been present being the half dozen firms constituting the main props of the Chambre Syndicale.

Lyons, which ranks second to Paris in car manufacturing importance, is represented by all its car makers, namely, Berliet, Rochet-Schneider, Cottin & Desgouttes, La Buire, Luc-Court, Barron-Vialle, and the Zenith Carbureter Co., whose home factory is in this town. Other European firms taking part in the fair are Peugeot, Piccard-Pictet, Th. Schneider, Turcat-Mery, Le Zebre, Unic, Fiat, Isotta-Fraschini, Moto-Aratrice, Rolland-Pilain, Saurer, Sigma, Delaunay-Belleville, Spa, and Alda. Manufacturers of components, such as axles, steering gears, ball bearings, magnetos, plugs, etc., form an important section of the motor car and general engineering departments.

The Lyons fair is not a show in the sense of the Paris salon or the New York show. The participants are housed in temporary wood offices, just sufficiently big for the purpose and built without any view to decorative effect, on the banks of the Rhone and Saone, in the heart of the city. There are about six miles of these stands. There is nothing to attract the retail buyer and no attempt is made to secure his presence. The committee responsible for the fair frankly avows that it is out to smash the Leipzig fair and make Lyons the trade mart of the continent of Europe. The first ex-

All of the stands, of which there were over 2,000, were uniform in design. Some of the bulletins were American catch phrases. The one in the center between the doors translates: "Time is money. Come in here. You will gain time"

Above is a general view of the Lyons trade fair. Note the general uniformity of booths and signs. No effort was made to gain anything unusual in building construction or display

Above is a section of the Lyons trade fair. This shows the Pullman and Scripps-Booth stands with a Maxwell car in the foreground

Right—This is the technical educational exhibit which occupied a conspicuous position at the Lyons trade fair

hibition opened last year with 790 exhibitors. This year there are 2320 stands, with a greater number of firms represented, for some dealers represent three or four manufacturers. The Leipzig fair united 1300 exhibitors in 1897 and had risen to 3700 in 1910, so that the rate of progress of the French fair is very much greater than that of the German rival. It is claimed that last year business was transacted to the value of $10,000,000, and that another $8,000,000 worth of business had to be refused owing to the inability of the firms to execute.

At this writing it is too early to say what will be the practical result of the 1917 fair, but in spite of very restricted railroad facilities, very severe weather which

has already made it necessary to postpone the opening for one week, and has delayed the completion of some of the stands, Lyons is so crowded with buyers and sellers that it is difficult to find accommodation at the hotels. Lyons has a population of more than 700,000, and the organizing committee has made adequate arrangements for the lodging of a large number of visitors in private houses. Also by a direct appeal to the intelligence of the hotel proprietors and restaurants they have succeeded, so far, in preventing any boosting of prices.

The fair is extensively advertised, is well managed in every respect, and is a striking example of the industrial and commercial revival of France and of the determination of that nation to succeed in the trade war which will follow the present clash of arms. Both allied and neutral nations are being attracted to Lyons and given exactly the same facilities as the home manufacturers, but no enemy goods of any kind are allowed to be brought in. By reason of its geographical situation, within easy reach of all parts of France, of Italy, Switzerland, and Spain, Lyons holds all the advantages. It is a pity, therefore, that both Paris and Bordeaux have thought it necessary to hold an annual fair. There is considerable local feeling against the action of these two cities, for the competition is certainly unnecessary.

### ROSS INCREASES PRICE

Detroit, April 27—The Ross Automobile Co. has increased its price from $1,575 to $1,775.

### "WE TEAR 'EM UP"

Two scenes in the story in MOTOR AGE issue of April 26 entitled "We Tear 'Em Up and Sell the Pieces" were improperly captioned. The view on page 5 and the scrap heap on page 8 were photographs of Warshawsky & Co., Chicago, who wreck from five to ten cars every day. The slogan, "We Tear 'Em Up and Sell the Parts," is not used by the Auto Wrecking Co., Kansas City. This was the first concern to use the slogan "We Tear 'Em Up and Sell the Pieces."

# Hudson Ready to Race

## Cars for Big Speed Events Represent Stock Qualities of Structure

### Standard Touring Frame Used With Few Alterations

FEW departures have been made from stock car structure in the preparation of Hudson racing cars. In the first place, Hudson did not consider any speed events in making out its 1916 program except those for stock cars, because it did not believe then that successful racing cars could be built without departing so radically from stock car structure that the racer would signify nothing of what a standard car could do. But that belief has been changed, and as a result Hudson racing cars which truly represent stock car qualities are now ready for the big speed events.

The bore of the five racing specials is 3.50 in.; stroke 5 in.; displacement 288.9 cu. in. The crankcase and cylinder block design is standard. The latter is equipped to take two carbureters on the same manifold. The crankshaft is the standard Super-Six design. All other parts are of standard materials, except the pistons, which are Magnalite metal instead of cast iron. By reducing the weight of the standard parts through dispensing with surplus metal and decreasing certain sections, it is the hope of the Hudson engineering department to gain information which may be of use in further developing and improving the standard design. For instance, it would be impossible to accurately develop improvements in heat treatment which would be of benefit to the stock product if any important changes were made in standard design.

**Timing Is Standard**

Even the timing of the racing specials is standard. The valve areas have been increased from 1 13/16 to 1 55/64 by boring out the valve port and substituting a valve with a larger head. The lift is increased from .3125 in. to 3.175 in., about 1/16 in. Lighter valve tappets have been obtained by omitting the adjustment and making them hollow.

The standard valve springs have been compressed to make them stronger and thus insure greater accuracy of action at high speeds. Timing gears are standard, but the camshaft is changed to give the increased valve lift. Standard material is used in the connecting rod assembly and the wrist pin, but they have been pared down to secure the least weight.

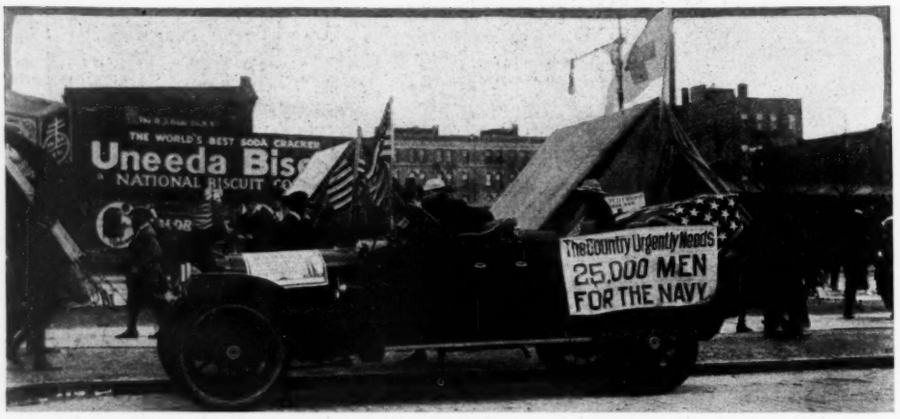
The racing engines are fitted with an auxiliary high pressure oiling system operated from the camshaft. This is a rotary or gear pump, designed to circulate the heavy castor oil used for high speed work. The oil is pumped through a cooler to the four main bearings and from there direct to the connecting rod bearings. The object of this pump is to drive a sufficient quantity of cool oil through the connecting rod bearings to carry off the heat generated by the development of great excess power. These engines develop 115 hp. and will sustain this load consistently for many hours without relaxing. It is apparent from this detail of Hudson racing car specifications that these engines are not racing engines in the accepted use of the term. More accurately, they are commercially practicable modifications of a stock product and would be equally serviceable in touring or for high speed work, were such power in demand.

**More Efficient Cooling**

As in the building of the Super-Six racing engine the same policy of development by racing has been followed throughout the design of the specials. The frame is a standard touring car frame in all respects, except that it has been shortened, drilled and cut away to make it lighter. The axles are the same; the springs are the same. They have been reduced in weight only by paring down the standard product. The transmission, the propeller shaft, universal clutch, pedal control and all minor details are of regular Hudson stock materials. The radiator is standard but is inclosed in a special shell designed with the sole idea of lightness and minimum wind resistance. The same applies to the body which weighs about 85 lb. complete with tail, floor-boards and bonnet.

Cooling louvres in the bonnet at the body dash are designed to permit the maximum circulation of air through the hood and carry away the heat of the exhaust manifold. The complete car will weigh approximately 2100 lb. empty. The maximum gasoline to be carried is 50 gal.; oil, 11 gal. There are two gasoline tanks and two oil reservoirs, the latter separated to afford the best cooling facilities.

Except for the cost of building the special body, the racing special has been produced from the standard Super-Six at a moderate extra cost. As a quantity produc-




**This Packard car was photographed in front of the navy tents at 168th street in New York Its banners are self-explanatory of the preparedness work represented**

tion car it could be made at a cost slightly in excess of the Hudson Super-Six.

Ralph Mulford and Ira Vail will hold the first wheels for the Hudson, with Bill Chandler, Ralph Kriplen and Jack Gable as reserve drivers. Billy Chandler will have charge of the mechanics and rule the pits. Arthur J. Hill, formerly manager of Dario Resta, will manage the team.

All of the prize money that the team wins in the big events will be divided among the men comprising it, and the Hudson company will share in it in no wise.

### PREMIER PRICES RAISED

Indianapolis, Ind., April 27—Premier prices are to be raised. On the roadster and seven-passenger touring car there is an increase of $90, the new price being $1,985 for each model.

### NEW FOUR-DRIVE TRUCK

Clintonville, Wis., April 28—Another four-wheel-drive truck company is being formed at Clintonville. This is to be known as the Clintonville Duplex Truck Co. and the moving spirit is Beserdict, formerly of the Four-Wheel-Drive Co. This is not the same concern as the Duplex company of Lansing, Mich.

### FISHER INCOME STATEMENT

New York, April 27—The Fisher Body Corp. has filed with the New York Stock Exchange the following consolidated statement of income of the parent company and subsidiaries for the period Aug. 21, 1916, to Feb. 28, 1917:

| | |
|---|---|
| Profits from operations..... | $1,369,730 |
| Other income-interest, rentals, etc. | 94,106 |
| Total net income ..... | *$1,463,836 |
| Dividends paid on preferred stock. | 175,000 |
| Surplus ..... | $1,288,836 |

*After allowing for full dividend requirements of 7 per cent on 50,000 shares of preferred stock, the balance applicable to the common stock is equivalent to $5.56 a share earned during the above period on 200,000 shares of common stock.

### ASKS BIDS ON DUPLEX PLANT

Lansing, Mich., April 28—The Duplex Truck Co. has advertised for bids for the construction of its new factory building in this city on the 15 acres bought last fall. The plans for the new building are now completed and ready for the contractor. The proposed building will be 72 by 600 ft., two stories. The company may move none of the Charlotte equipment to Lansing, as the Charlotte shops may have to be used as auxiliaries to meet the sales department demands. The capacity of the shops to be built this spring is but ten complete trucks a day. Under the company's present plans, provisions will be made, when the additional shop building is put up, to make all parts here except the engines.

### RAUCH & LANG UP $200

Columbus, Ohio, April 27—The Baker R. & L. Co. will increase the price of the R. & L. electric car $200 May 1.

# Soldiers on U. S. Trucks

## Fort Sam Houston Replaces Civilian Drivers With Enlisted Men

### Most of Men Handling Motors Now in Army

FORT Sam Houston, Tex., April 27—The quartermaster's department of the United States army has adopted the policy of repacing civilian drivers of motor trucks with enlisted men as rapidly as possible. It is stated here that nearly all the touring cars that are in the service of the officers of the army are already driven by enlisted men, although only a few months ago most of the drivers were civilians. In explaining the policy of the Government to do away with civilians as drivers in the motor vehicle transportation department of the army, Major J. F. Maddon who is in charge of this branch of the service here under the direction of Colonel H. L. Rogers, Chief Quartermaster of the Southern Department, said:

"In case we employed civilian drivers and one of these were to be hurt the Government could do nothing for him. He would not be eligible for pension and he could not be given the care that an enlisted man could be given. When enlisted men are injured they are given the best of care at the base hospitals and they enjoy many other attentions that civilians cannot secure under law."

There is no trouble in securing enlisted men to handle the motors and also for machine shop work, according to Major Maddon. If a civilian, who is an expert mechanic or an expert driver, appears and applies for work he is informed that he can have the desired work by enlisting and in the majority of cases the applicants are enlisted immediately.

A new feature of motor car company work has been installed at Fort Sam Houston. Motor truck companies are to be given three-month tours of active service. Each company will, in turn, be sent on a ninety-day trip along the border. At the end of this period the company will be ordered back to the base here and will then be stationed here for three months of instruction in operation and repair work.

The large new shops at Fort Sam Houston are being operated day and night placing the motor trucks in perfect condition for field service.

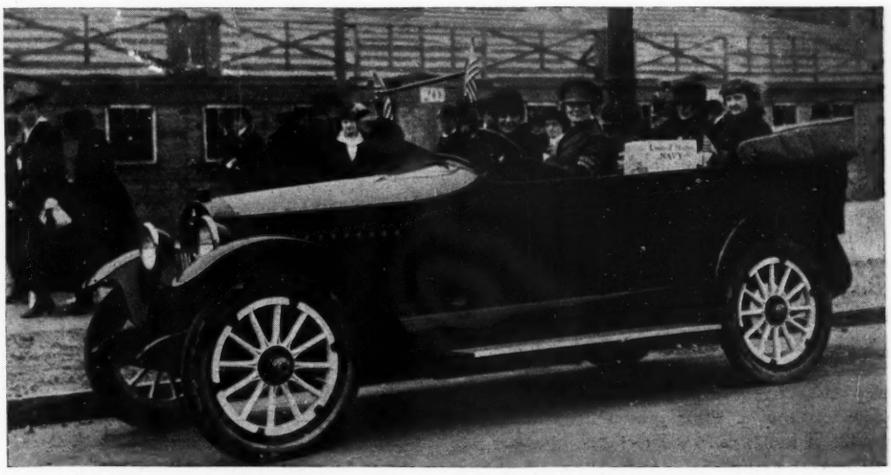
### ORDERS TRUCKS MARKED

Washington, D. C., April 26—The militia bureau, War Department, has issued orders to the effect that motor trucks supplied to machine-gun companies of the national guard shall be marked with legends in black with letters 4 in. high for capitals and 2 in. high for small letters, diagrams being sent the manufacturers showing the legends for the right side of the truck, and also for the tail gate. Brig. Gen. Mann, chief of the militia bureau, in his order says:

"The letters 'U. S.,' car number, and ordnance marks, will not be altered, obliterated or changed in any way. The state abbreviation will be limited to four letters."

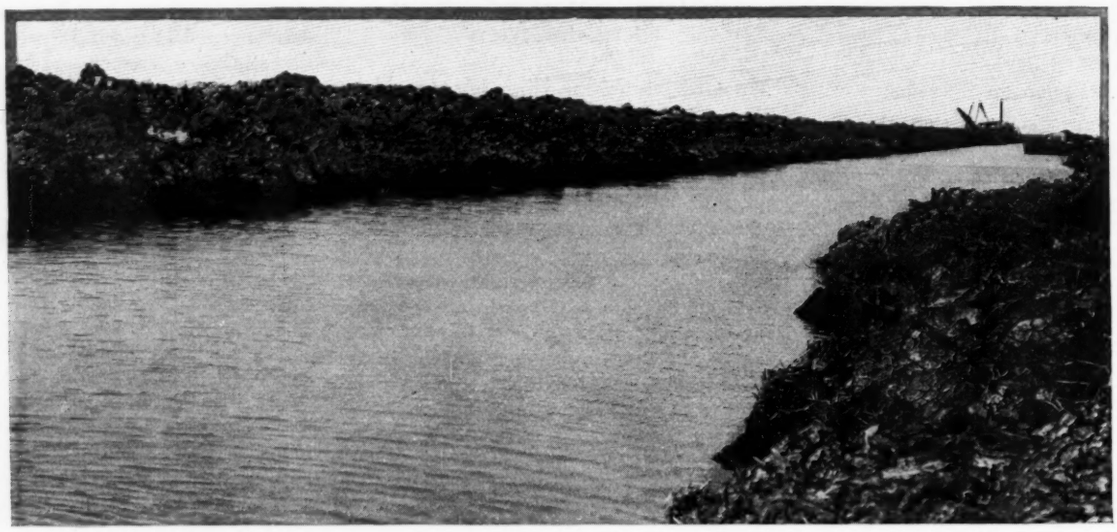
### FAGEOL TRUCKS JULY 1

Oakland, Cal., April 27—Plans for establishing a motor truck factory in Oakland, Cal., have just been announced by the Fageol Motors Co. The new plant will be equipped to turn out the new type of motor truck which this company will produce. The first allotment will be for 150 trucks, ranging in size from 2-ton to 5-ton. The first unit of the factory will be 50 by 250 concrete and steel construction. Deliveries will begin about July 1. It was announced some time ago that no more Fageol passenger cars would be produced just now, as the entire output of Hall-Scott engines, which were used in the passenger, has been taken by the government.



Women and motors combine in recruiting for navy—The car here is in front of the Billy Sunday tabernacle in New York

# Monument to Road Engineering



*Part of embankment between Chef Menteur and the Rigolets which is being graded and surfaced with shells. When the road is completed it will have a 25 to 30-ft. crown, a 100-ft. base and will be from 8 to 10 ft. above the level of the canal*

## Outlet from New Orleans to the Gulf Coast Is Made by Dredging a Canal and Throwing Up An Embankment—Skeptics Said It Could Not Be Done

**By William K. Gibbs**

ENTRANCE to the city of New Orleans from the east, over a road that will be a monument to modern road engineering, will be possible by next fall. To one not versed in the topographical conditions surrounding New Orleans this announcement may not seem out of the ordinary, but to those who are familiar with the salt marshes along the Gulf in Louisiana, the full import of this intelligence will be evident.

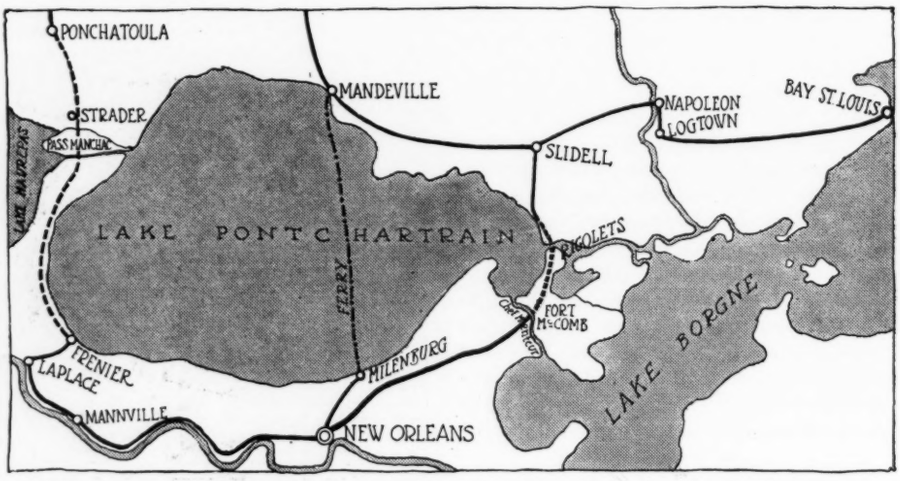
Separating the American Riviera—in other words, that part of the Gulf coast that stretches between western Mississippi and Biloxi—and the Carnival City of New Orleans is a vast marsh that is but a few feet above sea level at low tide, consequently at high tide it is practically under water.

**Individuals Subscribe Funds**

A group of New Orleans men who appreciate what unrestricted tourist travel into that city would mean as a business stimulus undertook the project of building an eastern highway outlet into Mississippi. Their efforts were characterized as lacking in good judgment by many people in New Orleans and vicinity, but they were confident that such a road could be built and were willing to draw upon their individual fortunes for its construction. Ultimately, the wisdom of their judgment made itself evident and now New Orleans is eager for the day when the project will be completed.

Some 18 miles from New Orleans is a channel leading out of Lake Pontchartrain into Lake Borgne. This channel is known as Chef Menteur. Between it and the point on the map known as the Rigolets, another shallow outlet for Lake Pontchartrain, is a stretch of marsh, much of the time under water and having a rank growth of marsh grass that would hide an ordinary man standing in it, if indeed, he was not swallowed up by the mud beneath this grass.

It was through such a marsh that a part of the contemplated outlet for New Orleans to the east had to be built. It was found that by dredging a channel 30 ft. wide and 10 ft. deep, the material would make an adequate embankment for a roadway, the channel, at the same time draining the area. Contracts were let and the dredging begun nearly two years ago, but the original contractor failed, his dredge sunk and when the writer visited the work last fall there were enough sheriff notices posted inside the cabin of the dredge to paper a good-sized room. However, the first contractor succeeded in dredging some 3½ miles of the channel. Early last winter the




*This map shows where the dredge work is being done on the road that will give New Orleans an opening to the east. The dotted sections near Slidell have not yet been started. The map also shows where the other proposed road is to be built along the west end of Lake Pontchartrain, the dotted line being where an embankment will be necessary*

*This shows a section of the semi-circle of gun rooms on the Gulf side of Old Fort Macomb at Chef Menteur, Louisiana. These rooms will be cemented, decorated and used as private dining rooms in the new Tourists Club that is to be built on the ruins of the old fort. The white spots in the center of the illustration is the light filtering in through the little windows designed for the cannon to shoot through and which are seen in the illustrations below*

sunken dredge was removed and two other dredges put to work, one at each end of the proposed channel. These have been constantly at work and all but 2 miles of the embankment near the Rigolets has been completed. The two dredges are still working and several large stretches of the embankment have been crowned and graded and are ready for the surface of shells. The crown of the road, which is from 8 to 10 ft. high with a 100-ft. base, will be between 24 and 30 ft. wide.

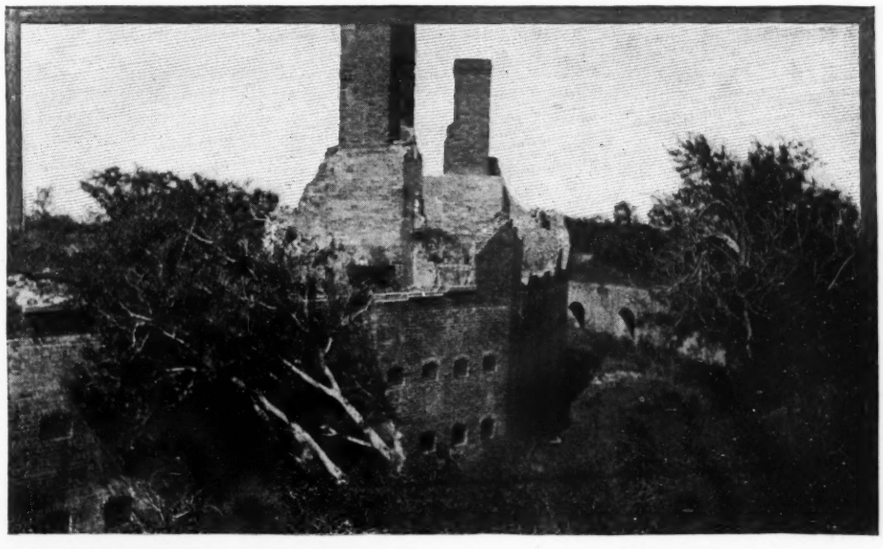
The character of this material taken out by the dredge is such that it blends together and does not easily wash. The long tough roots of the marsh grass bind the earth together and the earth itself carries a large percentage of clay. This road, when completed, will be a monument to its makers. Sweeping across this great marshland, it will be high enough to command a view for miles across Lake Pontchartrain, Lake Borgne and on to the Gulf proper. The surface, as has been said, will be broad and it is not unlikely that ornamental posts carrying electric lights will be placed soon after the road has been completed.

**An Avenue of Palms**

The 18-mile stretch of road that connects New Orleans with Chef Menteur, where the dredge-made road begins, also is over marshland, but this has been largely drained and is under cultivation probably half of the distance. Each side of this 18-mile road has been planted with palms which will make it rival Los Angeles' Avenue of Palms when they get their growth. Something unusual in road construction is also found in the building of this part of the outlet link for New Orleans. After the right-of-way had been cleared a grade was thrown up and curb boards put in place as shown in one of the illustrations. Since this road parallels the Louisville and Nashville railroad, getting material to the spot was easy. Slag from the steel mills at Birmingham, Ala., was hauled there in carloads and dumped at convenient points. Narrow gage tracks were laid and donkey engines hauled small cars of this slag along the right of way, this slag being laid to a depth of 6 in. When one side of the slag bed was laid the track was moved and the other side laid. It must be remembered that the character of the ground precluded the use of motor trucks as they would have been useless in this soft soil.

Concrete culverts were built and at present the slag has been laid for about 13 of the 18 miles. As the slag is laid the work of surfacing is progressing and within a few months this connecting link between New Orleans and "The Chef" as Chef Menteur is referred to by the native of the Crescent City, will be completed.

From the Rigolets on to the Mississippi line by way of Slidell, La., about 7½ miles of embankment will be necessary, this being in two stretches. The police jury of



*Above is a part of the ruins of Old Fort Macomb. That part to the right is the wall, which is surrounded by a mote. This will be fashioned into a promanade. Below is a view taken on the opposite side from that shown above. This inner section will be a court with horticultural displays*

*This shows how the slag from the steel mills at Birmingham is laid on the road leading from the Chef to New Orleans. Note that narrow-gage track is laid for hauling this slag to the road bed. The slag is laid 6 in. deep and dressed with gravel and macadam*

St. Tammany Parish, the parish between the Rigolets and the Mississippi line, has started a survey for the continuation of this road. This will require an embankment of 4 miles to connect with the road to Slidell. From Slidell, the road will continue along what is known as the Roberts road to East and West Pearl rivers. Here it will be necessary to build an embankment of 3½ miles to connect with Napoleon, Miss., from whence connection can be made for the other Gulf Coast towns and cities. The Pearl rivers will be bridged.

Two free ferries will be maintained, one at Chef Menteur and one at the Rigolets. The ferries will be operated 24 hours a day and there will be no waiting. Ultimately these places will be bridged, but for the present the ferries will meet the needs. The work in Orleans Parish, that is up to where the road crosses the Rigolets, probably will cost in the neighborhood of $250,000.

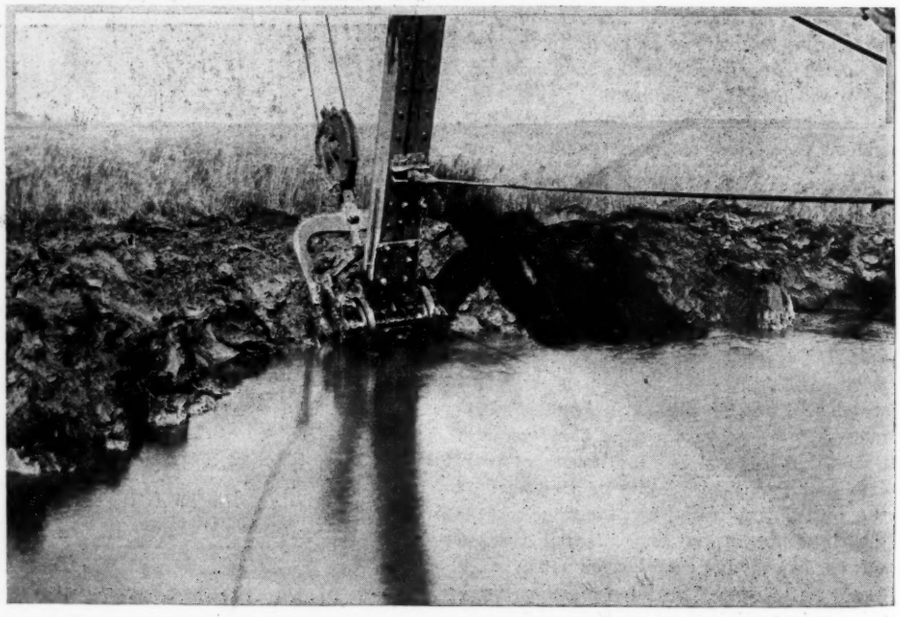
At the point on Chef Menteur where the road will cross that channel is the ruins of Old Fort Macomb, several views of which are shown herewith. This old fort never saw service and is now abandoned. P. M. Milner, who largely is responsible for this road project going through, and for whom the channel being dug to furnish material for the embankment between the Chef and the Rigolets is to be named—Milner Canal—has plans for converting the site of Fort Macomb into a tourist club. Using the base of the old fort as a foundation, an up-to-the-minute club house is to be built and ready when the road is opened to the public. Here the tourist will find a place to stop, enjoy boating, golfing and other pleasures of club life. The side of the fort toward the Gulf is laid out in a semi-circle and is a series of rooms with arched ceilings and small windows through which guns were to be discharged. These rooms are to be fitted up as private dining rooms for tourist parties. The plans for this club house will utilize all the old fort relics possible. There will be a promenade around the periphery of the fort, over which it is a sheer drop of some 20 to 30 ft. to the moat below.

Mr. Milner is confident that the macadam pavement of the Chef Menteur-Rigolets embankment will be finished by December of this year and that tourists will come into New Orleans by this road to the Mardi Gras in 1918.

It is a possibility that does not commonly exist for New Orleans as a city to expend as much of its resources as it seems fit in improving the lands of the parish, for the corporate limits of New Orleans and that of Orleans Parish are the same. There is no county government; just the city government, which is of the commission form. While the eastern limits of Orleans Parish is some 30 miles from the New Orleans limits proper, it is all New Orleans. There is a 7,000-acre orange grove within the city limits of New Orleans, but this is accounted for by the fact that the county and city limits are the same, as just explained. Now that the work is progressing so nicely, mostly by private effort, New Orleans is interesting itself in the work as a municipality and largely through a realization of what tourist traffic means to any city; a trade of which New Orleans has had little to date because of the city's inaccessibility.

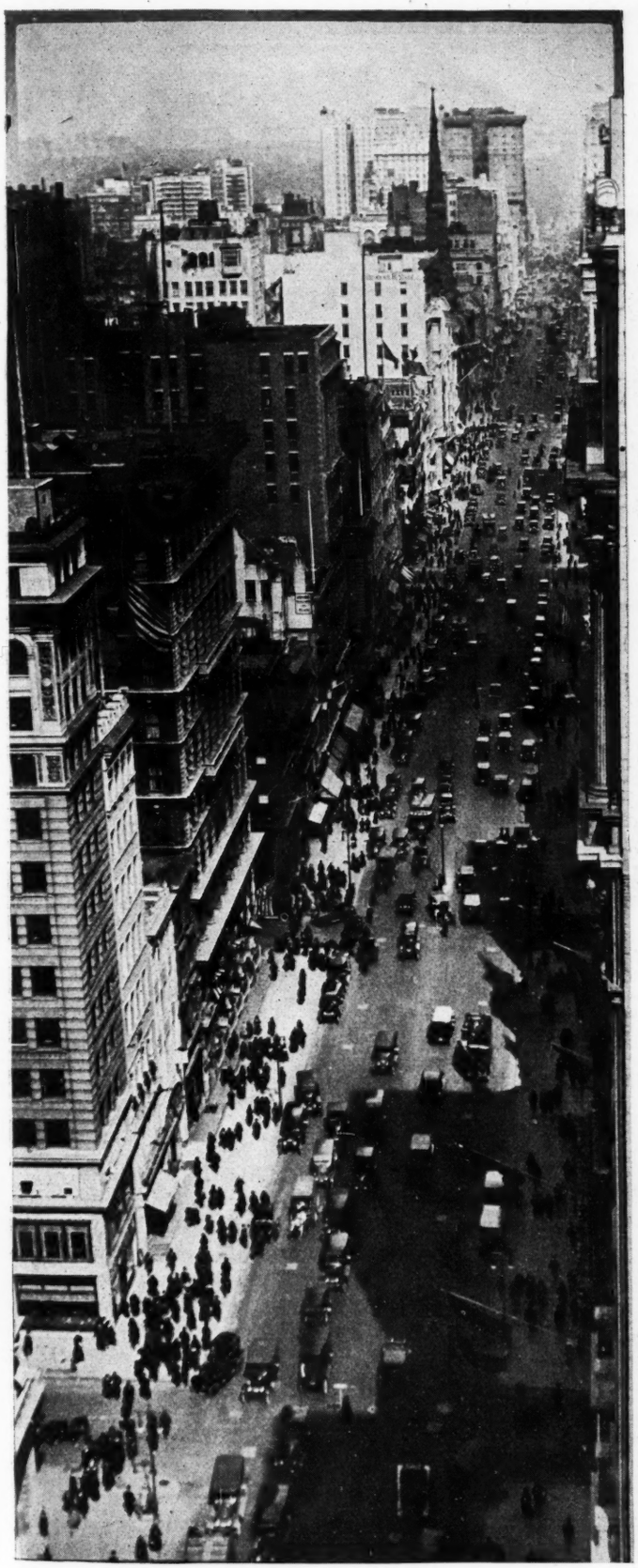
The success of his plan to build an eastern outlet has led Mr. Milner to start a plan for building a road into New Orleans around the western end of Lake Pontchartrain. He is urging the two parishes through which this road would pass—St. John the Baptist and Tangipahoa—to assist in the building of this road. From Ponchatoula, which is reached over fairly good roads from the north, the proposed road would lead across Pass Manchac to Fernier. This whole distance is about 20 miles and the road could be built mostly by dredging a canal and throwing up an embankment between Ponchautoula and Fernier. There is a good earth road from Fernier to La Place, about 4 miles, and the river road is joined at La Place. This is the most direct route into New Orleans and it is Mr. Milner's contention that New Orleans could well afford to pay the whole expense of building the road, since he believes that the first year the road was open to tourist travel, it would pay for itself several times over. If it were found desirable the road could go from Pouchatoula to the mouth of Pass Manchac at Lake Pontchartrain, where Pass Manchac is quite narrow and a draw bridge could be put in at a cost of not over $75,000.

The parishes through which the proposed road would pass are taking an interest and Louisiana representatives in Congress have been approached with a plan to have the Government make this a military road.



*Taking bites out of the marsh mud. This is the character of land through which the channel was dredged to get material for making the embankment that will ultimately make one of the finest short stretches of highways in the country*

# Gotham's Busiest Traffic Streets



*This is a view of Fifth avenue from Forty-second street, one of the busiest traffic corners in America. This view is looking north; traffic to the south is as great if not greater*

*This shows Forty-second street, New York's great cross-town thoroughfare, west of Fifth avenue. Traffic congestion on this street is nearly as great as on Fifth avenue*

# The Junior Racing Car

## Its History and Construction

### Part I

**By Harry H. Hartz**

THE United States has long been recognized as the most progressive nation in the world. She has been the "proving ground" for such great men and inventions as Thomas Edison with the electric light and phonograph; Alexander Bell and the telephone; Marconi and the wireless; Samuel Morse and the telegraph and many other men and creations which have, to a great measure, succeeded in revolutionizing the world.

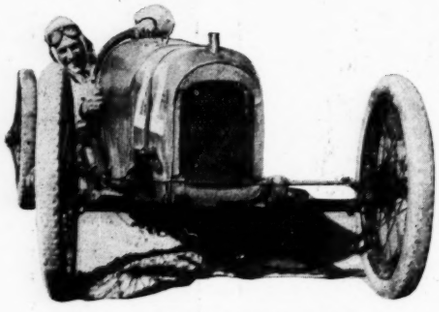
While there seems to be much discussion as to the first man to recognize the value of the internal combustion engine as an aid to transportation and so to utilize it, nevertheless, in spite of claims and counter-claims of other countries, the United States can safely assume that she was the pioneer in this field which has developed into such a boon to our modern civilization.

**Self-Confidence Developed**

With the progressiveness of the United States and the men who have made her what she is, has come a spirit of do and dare which has been transmitted unto even the third and fourth generation and the result has been that the youth of America has developed into a class of self-confident youngsters, full of initiative which has borne fruit in the form of many and varied contributions to science and mechanics, many of which have proven of inestimable value to the progress of the world. If it had not been for the desire of Orville Wright to emulate a bird, it is highly probable that mechanicians and engineers would still be searching for a manner of traveling through the air.

When the motor car commenced to come into its own and its mechanical makeup began to fix itself firmly in the minds of the country, that is, when it ceased to be an experiment and became one of those commonplace articles which everyone knew something about, the youth of the land, always on the alert for something new, began tinkering with the horseless carriage, the outcome of the matter being that many youngsters became imbued with a knowledge of motor cars and motor-car construction second only to their makers.

*Harry Hartz, the author, master junior driver of the world and winner of practically every important juvenile motor-car contest ever held*



*Front view of one of the class B creations. In this type the engine, of motorcycle type, is hung on the side of the frame instead of under the hood as is the case in the class A type*

With the advent of the motor car and its popularization came the desire for contests, and the interest which was taken in the Vanderbilt Cup events which were held on Long Island will long be remembered.

Mother, father, sister, son and brother packed up the old dinner basket and everyone spent the day at the race, arising at 4:30 and sometimes spending the night beside the course to insure a choice position when the pilots should start on their grind the next day.

It is this same spirit which has prompted the interest in the junior car racing game. Not one of the gathering at the old Vanderbilts, father not excepted, took the interest in the contest that the small son of the family did.

He knew the drivers, their cars, the cars' past records, how many races each driver had won, how many cylinders each car contained, each cylinder's valve action and many other details of their construction of which fond father had no conception.

**Origin of Junior Racing**

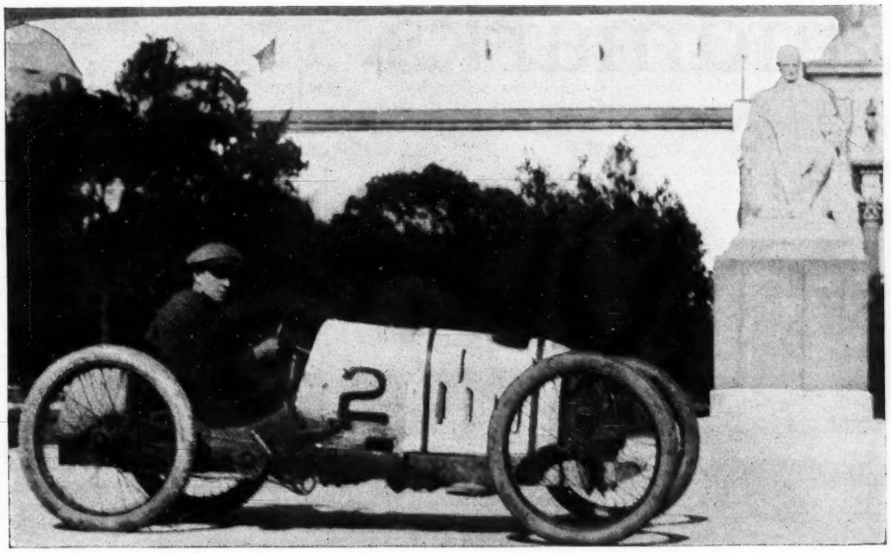
Little Bobby or Jimmy, as the case may be, carried the desire to become one of the racing pilots with him at all times and frequently expressed his sentiments on the matter, much to the disgust of his mother and to the pride of his fond pater, for the latter always averred that the youth was a "chip off the old block" and gave voice to opinions of "what he would do in the racing line if he were a younger man."

You have seen this type of youth. Circuses, policemen, firemen and motormen all affected him in the same way but there always seemed to be something about the life of a racing driver, the fascination, if you please to call it that, which subjugated all other ambitions in the lad's mind.

Nearly three years ago, just after the 1914 Vanderbilt Cup and International Grand Prize races which were held at Santa Monica, Cal., this sentiment in the breasts of many lads crystallized into form, and the nucleus for the formation of one of the most unusual organizations and the most novel sports for the youth of the land, junior motor car racing, was established. It is now a California institution, same as the tamale and the Chinee wash man. Hand in hand with the introduction of the sport came the organization of the Junior Racing Association of America.

To no one person can be given the credit for its conception or its formation. Like

*One mile in 54 sec. Some speed. Harry Hartz getting the checkered flag after having traveled a mile an hour faster than any miniature car of equal engine size ever traveled before. Ascot Speedway, May 30, 1916*



*One of the class C creations, and a fast one at that, on the grounds of the Panama-Pacific exposition, where for two days the tiny cars performed before capacity grandstands*

Topsy, "it just growed." Along the same channels about this time ran several minds. E. H. Pendleton, who had acted as timer at several motor car contests held in southern California considered the possibilities of a youth's race with tiny pushmobiles, that is, coasters constructed to resemble the racing cars of such drivers as Ralph de Palma, Barney Oldfield, Earl Cooper and many others and propelled by much pushing from the rear.

At that time a small car propelled by a marine engine was quite popular and Pendleton, finding that several youngsters were possessed of these creations, put on a race between them as an added attraction. Barney Oldfield acted as referee and several other noted racing drivers served as additional officials. The contest was an unqualified success, though this was due entirely to the mechanically-propelled cars, the pushmobiles not even getting a hand.

**First Hartz Racer**

At the time of this event and several months previous to it, I had secured a two-cylinder motorcycle motor, a set of wire wheels and had plans laid for the construction of a tiny roadster. Needless to say, the apparent success with which the first race meet met changed my plans entirely and my first car instead of being the "comfy" roadster which I had planned, became a racing car with a speed of nearly 35 m.p.h.

The first meet in which I competed was held at Culver City, Cal., and consisted of a 25-mile two-cylinder race, a 15-mile one-cylinder race and a 30-mile free-for-all.

It was necessary, there being no other means available, to class the cars into one and two-cylinder divisions. This served the purpose at the time, but later several of the boys developed one-cylinder motors which propelled their cars at a much greater rate of speed than the majority of the two-cylinder affairs and then it was necessary for us to change our method of classification. The two-cylinder and free-for-all events were won by myself at an average of 28 m.p.h. Fully 15,000 people attended the meet and went away converted to the latest in sports, a conversion which they have been loath to forsake.

The Culver City meet was the first in which the various creations came together and creations is the only word which will adequately describe the vehicles. For the most part they consisted of a wooden frame with a motorcycle engine attached somewhere, some under the hood, some on the side of the car and even on the front axle. While several of the cars were graced with strips of tin bent over iron frames and shaped into the form of hoods, very few bore even this resemblance to a real car. As one by-stander remarked, they looked like nothing more than bugs scurrying to and fro.

From this motley array of creations, which established Southern California's progressivism at Culver City, evolved the two successful types of juvenile racing motor cars.

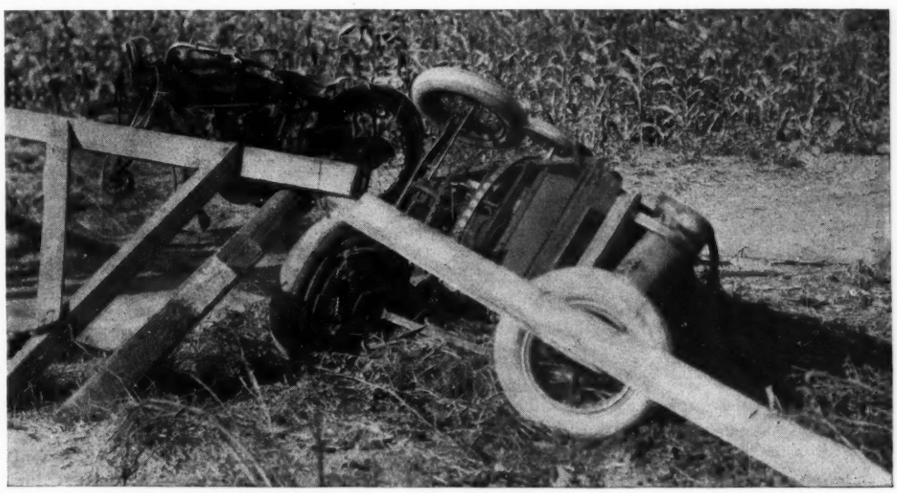
**(To be continued)**

*Here is the car in which Harry Hartz won his first event at Culver City. It is one of the first of the juvenile racing creations. As you will probably note, bailing wire and scrap tin entered largely into its makeup*

## 3268 SAXONS IN MARCH

Detroit, Mich., April 27—Shipments of the Saxon Motor Car Co. in March were 3268 cars, compared with 2604 in March, 1916. Shipments last month were the largest of any month since the organization of the company, with the exception of April, 1916, when the total reached 3405. March was the fourth month in which car shipments exceeded 3000, the other three being April, 1916, the record month, June of last year with 3122 cars and last December with 3016 cars.

Operations of the company in March represented a complete recovery from the effects of the fire at its plant in February, which restricted shipments in that month to 971. The company in the calendar year 1916 shipped 28,148 cars, compared with 18,755 in 1915 and 7323 in 1914.



*The tiny racers are not immune from accident. The steering apparatus on this one went wrong and the little car took down nearly 60 ft. of fence and rolled over three times before stopping. The driver was not scratched*

# Landmarks

*Remains of the old Shawnee mission, 3 miles out of Kansas City, established by Methodist Episcopal church in 1829. This is on National Old Trails*

*The historic Harris house, Westport avenue and Penn street, Kansas City, where gold-seekers awaited the fitting out of expeditions*

## Days of the 'Forty-Niner Recalled by Association with Structures on National Old Trails

AS THE traveler comes into or goes out of Kansas City over the route of the National Old Trails road through the old Westport district he can see, and he more likely will not see, an old brick building that is the Harris House of 'forty-Westport avenue and Penn street. This building is the Harris House of 'Forty niner fame. Westport was then the beginning of the journey by land to the far West; to the land of gold and wealth. Many a young man, blessed or burdened with the lust of gold and adventure, fresh from a home of Eastern refinement, lodged here in the last lap of his western trip. Many a famous man has left on record his experiences at this hospitable hostelry. Washington Irving, Horace Greeley, Senator Benton, General Fremont are among the names of those who stopped here. General Fremont left his wife at the Harris House for many months at a time while he was away on his expeditions in the far West. Francis Parkman, in "The Oregon Trail," describes the little settlement of Westport and, in all probability, he spent many hours in the office room of the Harris House talking to men and women who were waiting for their outfits to be completed before resuming their journey. The hotel was Gen. Curtis' headquarters during the battle of Westport which was fought Oct. 21-23, 1864. General Curtis watched the progress of the fighting from the roof of the building until he took charge in person. The hotel was operated by John Harris till the latter part of 1864. Since that time it has drifted from one renter to another. The ground floor is occupied by shops, but the other floors have not been used for several years.

The Harris House stands in the light of days gone past with as brilliant a record as many of our skyscraping hotels of today may be able to boast of in sixty or seventy years.

**Shawnee Mission**

Three miles southwest of Kansas City on the main line of the National Old Trails road may be found two brick buildings, the remains of the famous Shawnee mission. The mission was established in Shawnee in 1829 by the Methodist Episcopal church as a training school for the Shawnee Indians. In 1839 the Government granted the mission a tract of 2240 acres in another section of the county, where the buildings are now located. The mission property originally included some dozen buildings and the mission settlement was a town in itself. The building used as a dormitory and the one used as the school are the only buildings remaining. The cost of the buildings and improvements amounted to more than $75,000. The brick came from St. Louis and the lumber was shipped from Cincinnati.

These buildings were on the original route of the old Santa Fe trail and every day saw a number of freighter outfits starting out on their long journey to the Southwest.

The Bogus Legislature of Kansas, so famous during the days of Border troubles, met in these buildings in 1855. The mission continued in operation until 1862. Some plans have been made by patriotic societies of Kansas City toward purchasing the property and maintaining an Historical Inn of the Western Territory, but nothing definite has been done. It should be a spot of great attraction for cross-country tourists as well as citizens of the states of Kansas and Missouri, for the buildings are themselves the very spirit of the progress of the western country.

# Answers to Route Information Inquiries

**Chicago—Yellowstone—Seattle, Wash.**

OSHKOSH, Wis.—Editor MOTOR AGE—Give route from Chicago west to Denver through Cheyenne to Yellowstone Park, north to Glacier Park, thence to Spokane and Seattle, Wash.—A. C. Denniston.

From Chicago, proceed to Sterling, Hillsdale, Watertown, Moline, Davenport, Ia., Durant, Iowa City, Oxford, Marengo, Victor, Kellogg, Altoona, Des Moines, VanMeter, Adair, Atlantic, Oakland, Omaha, Louisville, Havelock, Lincoln, Milford, Fairmont, Hastings, Minden, Atlanta, Oxford, Arapahoe, Cambridge, McCook, Culbertson, Lamar, Neb., Holyoke, Colo., Sterling, Fort Morgan, Greeley, Brighton, Denver, Greeley, Eaton, Dover, Cheyenne, Wyo., Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Jct., Douglas, Glenrock, Casper, Johnsons Ranch, Powder River, Hells Half Acre, Waltman, Arminto, Los Cabin, Reids Ranch, Thermopolis, Basin, Otto, Burlington, Cody, through Sylvan Pass to Lake Station, Gibbon Station in Yellowstone Park, to Yellowstone, Mont., Hutchins Ranch, Ennis, Virginia City, Twin Bridges, Butte, Deer Lodge, Drummond, Bearmouth, Clinton, Missoula, Arlee, Ravalli, St. Ignatius, Ronan, Dayton, Rollins, Somers, Kalispell, Belton, Apgar, Glacier National Park, Kalispell, Rollins, Elmo, Polson, Ravalli, Missoula, Huson, Alberton, St. Regis, DeBorgia, Wallace, Kellogg, Cataldo, Coeur d'Alene, Spokane, Wash., Spangle, Rosalia, Steptoe, Colfax, Wilcox, Dayton, Waitsburg, Walla Walla, Wallula, Burbank, Pasco, Kennewick, Richland, Prosser, Grand View, Sunnyside, North Yakima, Selah, Ellensburg, Easton, Snoqualmie Pass, North Bend, Fall City and Seattle.

**Springfield, O.—Atlantic City, N. J.**

Springfield, O.—Editor MOTOR AGE—We desire the following routes: 1—Springfield, O., to Pittsburgh, Pa., to Atlantic City, N. J., to Washington, D. C.; 2—Springfield, O., to Niagara Falls; 3—Springfield, O., to Pittsburgh, Pa., taking in Lancaster, Pa.—P. T. Rathbun & Co.

From Springfield, O., proceed to Columbus, Newark, Linnville, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Washington, Pa., Canonsburg, Bridgeville, Carnegie, Pittsburgh, Wilkinsburg, Greensburg, Ligonier, Bedford,

Everett, McConnellsburg, Chambersburg, Gettysburg, Abbottstown, York, Lancaster, Coatesville, Bryn Mawr, Philadelphia, Camden, Hammonton, Absecon, Atlantic City, Franklinville, Woodstown, Pennsgrove, N. J., Wilmington, Del., Elkton, Bel Air, Baltimore, Elkridge, Laurel, Hyattsville, Bladensburg, Washington D. C.

A detour may be made from Pittsburgh to Niagara Falls by proceeding to Harmony, Mercer, Meadville, Venago, Waterford, Erie, Harbour Creek, North East, Ripley, N. Y., Westfield, Brocton, Fredonia, Irving, Farnham, Buffalo, Niagara Falls. Niagara Falls may be included in your return trip by proceeding from Washington, D. C., to Baltimore, Philadelphia, Trenton, N. J., Jersey City, New York, Albany, Utica and Buffalo, then going to Pittsburgh via the route outlined above.

Vols. 3, 4 and 1 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for these trips.

### Indianapolis—Washington-New Haven

Frankfort, Ind.—Editor MOTOR AGE—Give routing from Indianapolis to include Gettysburg, Washington, Annapolis, Baltimore, then to New Haven, excluding New York, returning by way of Niagara Falls.—Russell T. Gard.

From Indianapolis, proceed to Greenfield, Dunreith, Germantown, Richmond, Eaton, O., Dayton, Harshman, Springfield, Columbus, Granville, Newark, Linnville, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Elm Grove, Washington, Brownsville, Uniontown, Hopwood, Farmington, Grantsville, Cumberland, Hancock, Hagerstown, Frederick, Emmitsburg, Gettysburg, Pa., Littlestown, Smallwood, Cooksville, Brightwood, Washington, D. C., Beltsville, Laurel, Baltimore, Kingsville, Bel Air, Aberdeen, Perryville, Charlestown, Elkton, Newark, Del., Wilmington, Marcus Hook, Pa., Chester, Norwood, Darby, Philadelphia, Jenkintown, Hatboro, Buckingham, Labertville, N. J., Flemington, Somerville, Bedminster, Morristown, Parsippany, Montville, Mountain View, Pompton, N. J., Suffern, N. Y., Spring Valley, Nyack, Tarrytown, Kitchawan, Yorktown Heights, Somers, Brewster, Danbury, Newtown, Derby, New Haven, Waterbury, Danbury, Mill Plain, Pawling, Beekman, Arlington, Poughkeepsie, Rhinebeck, Clermont, Hudson, Kinderhook, Rensselaer, Albany, Schenectady, Amsterdam, Fonda, Little Falls, Herkimer, Utica, Chittenango, Manlius Center, Syracuse, Cammillus, Auburn, Seneca Falls, Waterloo, Geneva, Canandaigua, Lima, Batavia, Buffalo, Tonawanda, Niagara Falls, thence back to Buffalo, and on to Fredonia, Westfield, Erie, Conneaut, Cleveland, Mansfield and Columbus, from which point the first part of the route is repeated.

Vols. 4, 3, 2 and 1 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

### Jackson, Mich.—Pittsburgh—New York

Jackson, Mich.—Editor MOTOR AGE—Give route from here through Pittsburgh, Washington, Philadelphia, New York, Boston and back through the Berkshires.—Subscriber.

From Jackson, Mich., proceed to Holt, Mason, Jackson, Napoleon, Manchester, Clinton, Tecumseh, Palmyra, Blissfield, Ottawa Lake, Sylvania, O., Toledo, Leymoyne, Pemberville, Fostoria, Crawford, Upper Sandusky, Marion, Delaware, Columbus, Granville, Newark, Jacksontown, Linnville, Zanesville, Cambridge, Bridgeport, Wheeling, W. Va., Washington, Pa., Houston, Canonsburg, Bridgeville, Carnegie, Pittsburgh, Wilkinsburg, E. McKeesport, Adamsburg, Greensburg, Ligonier, Bedford, Everett, McConnellsburg, St. Thomas, Chambersburg, Gettysburg, Emmitsburg, Thurmont, Frederick, Ridgeville, Damascus, Gaithersburg, Bethesda, Washington, D. C., Beltsville, Muirkirk, Laurel, Baltimore, Kingsville, Bel Air, Churchville, Aberdeen, Havre de Grace, Perryville, Charlestown, North East, Elkton, Newark, Wilmington, Marcus Hook, Chester, Norwood, Darby, Philadelphia, Parry, Moorestown, Mt. Holly, Pemberton, Wrightstown, New Egypt, Cassville, Lakewood, Adelphia, Freehold, Marlboro, Matawan, South Amboy, Perth Amboy, Rahway, Elizabeth, Newark, Jersey City, Weehawken, New York, New Rochelle, Larchmont, Marmaroneck, Rye, Port Chester, Greenwich, Cos Cob, Stamford, Darien, Norwalk, Westport, Southport, Fairfield, Bridgeport, Stratford, Milford, New Haven, North Haven, Wallkingford, Tracy, Meriden, Berlin, Hartford, East Hartford, Warehouse Point, Enfield, Thompsonville, Conn., Longmeadow, Mass., Springfield, N. Wilbraham, Warren, W. Brookfield, Brookfield, Spencer, Leicester, Worcester, Shrewsbury, Northboro, Marlboro, So. Sudbury, Wayland, Weston, Auburndale, Newton, Boston, Cambridgeport, Medford, Everett, Revere Beach, Lynn, Swampscott, Salem, Beverly, N. Beverly, Wenham, S. Hamilton, Hamilton, Ipswich, Rowley, Newburyport, Salisbury, Smithtown, N. H., Hampton Falls, Hampton, Little Boards Head, Rye Beach, Portsmouth, Kittery, Me., York Corners, York, York Harbor, York Beach, Ogunquit, Wells, Kennebunk, Biddeford, Scarboro, Portland, Allens Corners, West Falmouth, Gray, Dry Mills, Sabbath Day Lake, Poland Spring, Poland, Cooks Mills, Naples, Bridgton, East Fryeburg, Fryeburg, Center Conway, Redstone, North Conway, Intervale, Glen, Bartlett, Bemis, Bretton Woods, Bethlehem Jct., Maplewood, Bethlehem, Littleton, Lisbon, Bath, N. Haverhill, Harverhill, Piermont, Orford, Lyme, Hanover, W. Lebanon, White River Jct.; No. Hartland, Hartland, Windsor, Ascutneyville, Claremont, North Charlestown, Springfield, Vt., Chester, Simonsville, Londonderry, Manchester, Arlington, Shaftsbury Center, Bennington, Pownal Center, Pownal, Williamstown, Mass., Lanesboro, Pittsfield, Lenox, Stockbridge, Great Barrington, Copake, Ancram, Pine Plains, Rhinebeck, Rhinecliff, Kingston, N. Y.

From Kingston, the tourist may go on to New York or take his choice of a variety of routes back to Jackson.

### Webster City, Ia.—Yellowstone Park

Webster City, Ia.—Editor MOTOR AGE—Am interested in trip from here to Yellowstone, prefer going one way via the Black Hills, S. D. Would like to go through Pocatello, Idaho.—S. S. Parkhurst.

We would not advise your going via the Black Hills, but suggest the following: From Webster City, proceed to Fort Dodge, Clare, Unique, Gilmore, Rolfe, Emmetsburg, Ruthven, Dickens, Spencer, Hartley, Sanborn, Sheldon, Hull. Rock Valley, Canton, Harrisburg, Sioux Falls, Dell Rapids, Brookings, Clear Lake, Altamont, Millbank, Big Stone City, Ortonville, Millbank, Twin Brooks, Waubay, Webster, Bristol, Andover, Groton, Aberdeen, Ipswich, Bowdle, Java, Selby, Mobridge, Wakpela, McLaughlin, Tatanka, McIntosh, Watauga, Morristown, Thunder Hawk, Lemmon, Petrel, White Butte, Haynes, Hettinger, Bucyrus, Reeder, Gascoyne, Scranton, Powman, Rhame, Marmarth, Baker, Plevna, Westmore, Ismay, Mildred, Fallon, Terry, Miles City, Hathaway, Rosebud, Forsyth, Pompeys Pillar, Huntley, Billings, Laurel, Park City, Columbus, Merrill, Big Timber, Hunters Hot Springs, Livingston, Emigrant, Gardiner, into Yellowstone Park, out via Gibbon Station and Yellowstone, Mont., Flat Rock Bridge, Osborn Bridge, Ashton, St. Anthony, Sugar City, Rexburg, Rigby, Idaho Falls, Blackfoot, Pocatello, Inkom, McCammon, Clifton, Dayton, Preston, Whitney, Franklin, Logan, Wellsville, Brigham, Ogden, Peterson, Morgan, Devils Slide, Croydon, Main Forks, Wasatch, Evanston, Dog Springs, Fort, Liman, Granger, Bryan, Green River, Rock Springs, Point of Rocks, Tipton, Red Desert, Wamsutter, Rawlins, Fort Steele, Walcott, Hanna, Carbon, Medicine Bow, Bosler, Laramie, Tie Siding, Beauford, Granite Canyon, Cheyenne, Egbert, Pinebluff, Bushnell, Kimball, Potter, Sidney, Lodgepole, Chappell, Big Springs, Brule, Ogallala, Paxton, Sutherland, North Platte, Gothenburg, Lexington, Wood River, Grand Island, Central City, Silver Creek, Duncan, Columbus, Richland, North Bend, Ames, Fremont, Hooper, Oakland, Lyons, Winnebago, Homer, Sioux City, Hinton, Merrill, LeMars, Oyens Sta., Remsen, Marcus, Cherokee, Storm Lake, Newell, Fonda, Pomeroy, Manson, Ft. Dodge, Webster City.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, will give you complete running directions for this trip.

### Chicago—Los Angeles, Cal.

Valparaiso, Ind.—Editor MOTOR AGE—Give route from Chicago to Los Angeles.—F. R. Marine.

From Chicago, proceed to Sterling, Hillsdale, Watertown, Moline, Davenport, Ia., Washington, Fairfield, Ottumwa, Seymour, Powersville, Mo., Osgood, Gault, Chula, Chillicothe, Utica, Braymer, Polo, Excelsior Springs, Liberty, Bellview Sta., Kansas City, Overland Park, Lenexa, Edgerton, Ottawa, Agricola, Emporia, Elmdale, Peabody, Walton, Newton, Halstead, Hutchinson, Nickerson, Lyons, Great Bend, Larned, Kinsley, Spearville, Dodge City, Garden City, Deerfield, Lakin, Kendall, Syracuse, Granada, Lamar, Hasty, Las Animas, LaJunta, Timpas, Thatcher, Tyrone, Hoehne, Trinidad, Starkville, Raton, Maxwell, Springer, Colmor, Las Vegas, San Jose, Santa Fe, Domingo, Albuquerque, Magdalena, Datil, Springerville, St. Johns, Concho, Petrified Forest, Winslow, Flagstaff, Grand Canyon, Williams, Ash Fork, Kingman, Needles, Ludlow, Barstow, Victorville, Devore, San Bernardino, Claremont, Glendora, Monrovia, Pasadena and Los Angeles.

Vol. 5 of the 1916 Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

### Los Angeles, Cal.—Bangor, Me.

Santa Barbara, Cal.—Editor MOTOR AGE—Give route you can recommend from Los Angeles to Bangor, Me.; also tell where I may obtain auto blue book, and what is the price.—L. M. Campbell.

From Los Angeles, proceed to Pasadena, Monrovia, Glendora, Claremont, San Bernardino, Hesperia, Victorville, Barstow, Ludlow, Amboy, Needles, Topock Bridge, Yucca, Kingman, Hackberry, Peach Springs, Seligman, Ash Fork, Williams, Flagstaff, Winslow, St. Johns, Springerville, Quemado, Magdalena, Socorro, Becker, Albuquerque, Domingo, Santa Fe, from which point follow the Santa Fe trail to Kansas City, thence to Bellview, Liberty, Pratherville, Excelsior Springs, Lawson, Polo, Cowgill, Plymouth, Chillicothe, Gault, Osgood, Lucerne, Powersville, Sewal, Ia., Seymour, Centerville, Moravia, Blakesburg, Ottumwa, Batavia, Brighton, Washington, Columbus City, Muscatine, Davenport, Moline, Watertown, Hillsdale, Erie, Galt, Sterling, Rochelle, DeKalb, West Chicago, Chicago, South Chicago, Hammond, South Gary, Hobart, Valparaiso, Laporte, South Bend, Ind., Mishawaka, Elkhart, Goshen, Kendallville, Edgerton, Bryan, Wauseon, Toledo,, Lemoyne, Fremont, Bellevue, Norwalk, Wakeman, Oberlin, Elyria, Cleveland, Painesville, Ashtabula, Conneaut, O., Erie, Waterford, Union City, Corry, Jamestown, Red House, Salamanca, Allegany, Olean, Belvidere, Andover, Hornell, Canisteo, Elmira, Chemung, Waverly, Owego, Union, Binghamton, Windsor, Bainbridge, Unadilla, Oneonta, Colliers, Worcester, Berne, Clarksville, Albany, Rensselaer, Nassau, New Lebanon, Shaker Village, Pittsfield, Ashfield, Shelbourne Falls, Greenfield, Athol, Gardner, Crockerville, Fitchburg, Groton, N. Chelmsford, Lowell, Lawrence, Haverhill, Amesbury, Newburyport, Somerville, Medford, Everett, Lynn, Salem, Beverly, Ipswich, Newburyport, Salisbury, Hampton, Rye Beach, Portsmouth, Kittery, York Beach, Ogunquit, Kennebunk, Scarboro, Portland, Yarmouth, Brunswick, Bath, Woolwich, Newcastle, West Warren, Rockland, Camden, Prospect. Hampden, Bangor.

Several of the blue books would be required for this trip, which may be obtained from the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, price $3.00 per volume.

# Importance of Fan Efficiency

## A. K. Schanze Points Out Defects in Water Jacket and Pump Design

ON THESE two pages are given, in part, the paper read by A. K. Schanze, Pitter Fan Co., on "Automobile Engine Cooling" before the Cleveland section of the Society of Automotive Engineers, April 20, a brief account of which appeared in last week's issue. In it Mr. Schanze states that the importance of the fan as a factor in engine cooling is frequently overlooked and its possible efficiency is lost. He also points out the necessity of ample water jackets, especially in engines using the thermo-syphon cooling system and states that in engines which have come under his supervision the radiators and circulating pumps are of such design that the water is all pumped out of the bottom of the radiator and for short intervals there is really no circulation in the engine. The efficiency of multi-blade fans and the good fan as a factor in cutting the cost of radiator manufacture were considered.

IT has been the writer's experience, during the various fan tests that he has conducted on cars of many different makes, to come across three or four apparently ideal water jacket designs. In the main, water jackets leave some room for improvement.

The mere solution of the problem of what *volume* of water a jacket must contain does not produce the answer to the problem. The *distribution* of the water layers around the cylinder walls may take on an aspect of even greater importance than the volume. Since ignition takes place in the top of the cylinder, the top is longest exposed to fire and becomes hottest. Modern engineering practice has placed the deepest layer of cooling water over the top of the cylinder, which is as it should be. However, the foundry practice in some cases seems to have interposed stiffening ribs or small columns on top of the cylinder. These act as retarders to the circulation, with the result that steam pockets seem to be formed. This shows itself in some engines whose water jacket volumes are adequate, in the sudden jump in temperature that takes place when the motor stops.

It has come to the author's notice on several occasions in tests that, when the motor was stopped, the temperature recorded by a thermometer placed in the filler cap mounted from 200° F. to 220° F. After losing two thermometers through having them blown out of an improvised bushing in a hole in the filler cap and seeing a jet of steam shoot upward 20 ft. into the air from a radiator that a moment before had not been near the boiling point, we became cautious and observant. Thermometers lashed in place showed that temperatures went to 220° F. Repeated experiments over the same ground could lead only to the conclusion that the whole mass of water was not being raised through that range of temperature in 40 or 50 sec., but some little patch on top of the cylinder was being converted to steam and the filler neck was being used as a steam dome faster than it could act as a relief through the overflow.

### Circulating System

This condition or the approach to it seems to have become such a common thing in some localities that the engineers concerned have become used to it and do not lay much stress upon its presence.

Steam above 212° means pressure, and there is no doubt that many a radiator manufacturer has been called upon to replace a leaky radiator that was really not defective in its own right. The danger to human beings lies in the possibility of a clogged overflow pipe, and an unsuspecting person taking a look into the filler neck at the psychological moment.

The water layer, then, over the top of the cylinder should not only be calculated upon a basis of its total volume, but should also be so arranged that the circulation system will handle all of it at a uniform rate, and so that, when the circulating system ceases to function, by virtue of the stopping of the engine, the layer will have a thickness such as to afford sufficient reserve to absorb the heat that remains in the cylinder after the last explosion, and no more heat is being added.

In order to prevent the overheating tendency immediately following the shutting down of an engine, it would seem necessary then to give the water jacket such volume and distribution as to enable it to absorb the last head accumulations, independent of the circulating system.

Between the pump system and the gravity system of circulation there is at present somewhat of a race for supremacy. From what the writer has been able to observe the two systems appear to show faults that lie at opposite ends of the chart. The pump system frequently overcirculates, or tends to, while the gravity system undercirculates. Both faults are conducive to trouble.

In practically all pump systems the speed of the pump varies with the motor speed. This is logical enough and conforms with good engineering theory and practice. Rotary pumps must attain a certain minimum speed before they do any effective work. This means that the starting point is considerably above zero, say, around 250 or 300 r.p.m. Then their efficiency increases after they get up to 500 r.p.m. and usually goes up on its curve to 800 or 900 r.p.m. The actual result is that when the motor runs at heating speed the pump, which was designed to do its circulating at a 20-m.p.h. car speed is working at high efficiency; the water is thrown up into the top of the cylinder and radiator tank faster than the internal friction of the radiator will allow it to return to the pump. The bottom of the radiator is thus one moment empty and the next full, or it may be simply allowing a small part of the water to pass into the pump and allowing a lot to be lost through the overflow pipes.

### Radiator Capacity

When the radiator is thus, in part, deprived of water, it is deprived of its chance to do the full amount of cooling of which it is capable. Overheating, or at least inefficient cooling, results.

It would appear, then, that it might be well to select a pump speed designed to do its circulating within the limits of the radiator frictional resistance and then always run the pump at that one speed regardless of motor speed.

The gravity system of circulation has been used with varying success. At best its impulse is feeble, due to the lack of head. On this account it succumbs readily to any abnormal frictional resistances that may result from solid matter in the water. It, of course, recommends itself because of its simplicity of construction, its low initial cost, its manifest economy of operation and the advantages derived from the fact that it continues in operation for some time after the motor stops.

Its practical application to the car, in a manner to realize all those advantages is difficult. At present too many of these systems are shaped in almost the same way that the pump system is shaped with pump omitted. Best results in gravity circulation as applied to the heating of dwellings and other buildings are obtained with the horizontal runs are comparatively short as compared with the head. The practical development of the system is still in its infancy and it is out of the question to say at this date anything but words of encouragement to users of the system.

Radiators offer about the largest variety of selection in the industry.

The elements to be looked for from the radiator builder's point of view are numerous, but the engineer whose function it is to select the proper article for his car can be guided by a few details.

After the car architecture has established the shape and the purchasing agent has fixed the cost limit, the designing engineer may go as far as he chooses. Frontal area should be a maximum and upon this follows net radiating area.

Radiating area can be reduced to a horsepower basis, as the act of radiating is exactly the process of doing work. Of the total heat of the engine absorbed by the water, we have only to deal with the small residue that would cause overheating if not carried off by the radiator.

The whole thing can be based upon the premise that a cubic foot of air, in passing through a radiator and being raised 50° F. in temperature has absorbed 1 B. T. U. A horsepower represents 33,400 B. T. U. and upon this basis we can arrive at the other results.

For efficiency only is it necessary to have the air passages free from solder obstructions, but it is just as important that they be of a size and shape that will give a good smooth run to the air. The more air that can be passed through a radiator the more will be its cooling power. We have also to take a careful look at the inside of a radiator to determine its freedom of water circulation and its capacity.

### How Cooling Varies

As a practical suggestion to car builders the writer offers that every purchaser be furnished a special card cautioning him to keep the exterior of the radiator clean as he possibly can. Much heating complaint would be avoided if radiators were kept clean. *Tests go to prove that when a film of oil gathers enough road dust the radiator efficiency is reduced to about one-quarter normal.*

Experiments conducted by the writer have confirmed the theory that cooling varies directly with the air quantity drawn through a radiator. Incidentally, similar experiments have shown that the temperature of the water in a radiator fluctuates practically, degree for degree, with the temperature of the air entering the radiator.

First, in the selection of a fan, should be considered the element of quantity of air delivery. The ideal radiator, as has been stated, is the one that will give off its heat at such a rate that the air that passes out of it can absorb no further heat units. In combination with this radiator, the ideal fan is the one which will draw air through the radiator at such a

high velocity that the air undergoes no measurable increase in temperature as it passes through.

At first glance it would seem as though this statement of the case partook of the old school-day problem of the irresistible force striking the immovable body, but closer inspection will reveal the fact that it is not quite that way.

The fan is the only link in the chain that can be made of practically unlimited power without throwing the system out of balance. Incidentally, it may be remarked that fan manufacturers have the world still to conquer in that respect.

Fans of any one design increase their capacities in an approximate geometric progression with the increase in diameter. Best practice would therefore suggest the use of the largest diameter possible on any particular model of car.

There are several distinct types of fans offered by the various manufacturers, classified for description as follows: Rim fans, which are those whose periphery is bound by a circular rim; flat-blade fans, which are usually of three or four flat blades built out from a central spider; curved-blade fans, which are similar in construction to the flat blade fans except that the blades are curved somewhat after the manner of a garden trowel; and the multiblade fans, which are of two or more arms, up to six, and in which each arm consists of two or more blades.

Taking them in the order named, we note two types of rim fans, viz., those having a very thin rim almost like a wire, and those having a broad rim equal in width to the sweep clearance of the blades. In the former type, as nearly as the writer can ascertain, the rim is supposed to add strength both in the resistance to centrifugal force and in the resistance to bending. It is also intended somewhat to act as a safeguard to the radiator should the fan become bent or out of line and strike the radiator. In the latter type of rim fans it appears that the intention is to reduce noise.

The writer has conducted air delivery tests extensively on both types of fans and has found them very inefficient.

### Flat-Blade Fans Common

Flat-blade fans are the most common in use at the present day. They are usually of the four-blade type built up on a central spider. Their air delivering qualities are not good at low speeds, say, at a peripheral speed less than 5000 f.p.m.; consequently they have to be run at very high speeds. High speed fans are noisy and consume a large amount of power. These two factors will be discussed later in this paper. It is safe to say that the flat-blade fans are very efficient when working at peripheral speeds in excess of 15,000 f.p.m., which, for 16 in. and 18 in. fans, is close to 3000 r.p.m.

Curved-blade fans, as class, are similar in their construction to flat-blade fans; that is to say, they are normally built up on a central spider and are of three or four-blade design, generally. In capacity and efficiency they are much ahead of the flat blade and rim fans. Of course, they do not show a constantly increasing efficiency at very high speeds, 4000 and 5000 r.p.m., but then good engineering practice would counsel against the use of any such fan speeds where it were possible at all to get away from it. These fans are good because their efficient speeds are generally comparatively low and they handle a considerable volume of air.

Of the multiblade type of fan there is only one such make at present in existence. This consists of groups of blades placed one behind the other and presenting somewhat the appearance of two fans upon a single hub. Experiment has demonstrated that this is far and away the most powerful and efficient type of disk fan yet produced. The capacity is from 50 percent to 100 percent greater than that of other types and its most efficient speed is down around 800 to 1200 r.p.m. for 16 in. to 20 in. diameters. It develops a high velocity pressure which drags air through the radiator even under adverse conditions. Its power consumption per cubic feet of air is at least 40 percent less than that of any other type of automobile fan it has been the writer's experience to test. It also has another quality that recommends itself to the automobile engineer—namely, it develops a high peripheral suction around an area about one-third its diameter. It will therefore be noted that it is decidedly centripetal and not centrifugal. This quality brings the edges and corners of a radiator into use. The advantages of this feature are self-evident.

Since many motors are so geared that the fans at times are supposed to be making as much as 4500 r.p.m., *the consumption, theoretically, gets up to* 6 *or* 8 *hp.* It is the writer's basic contention that such a power expended on driving a fan is so completely wrong that its practice should be discontinued without delay. Motors running up steep hills or through heavy roads are frequently shifted into low gear in order to let the cylinders do the work possible at high piston speed. Under such circumstances, then, the fan is demanding one-sixth to one-eighth of the motor's power. These 6 to 8 hp. generate their quota of heat, which again has to be extracted. It is a good fan which will assume this additional burden without allowing boiling.

In looking at the situation from a practical standpoint we must investigate the medium through which this high power reaches the fan. This transmission is usually through a belt, either flat or V. Can a leather or canvas belt, whose contact width is between ¾ in. and 1¼ in. transmit much over 3 hp. The best authorities on the subject say it cannot be done.

The summary of the whole situation then is that, when the motor gets beyond a certain speed limit, such that the fan should begin to make from 4000 r.p.m. up, the belt begins to slip and once this condition has set in the fan becomes worse than useless for that particular set of conditions. A slipping belt does itself a lot of harm in addition to polishing the fan pulley so as to make the percentage of slip at normal speeds greater.

### Noise at High Speed

The reason for going into this branch of the subject so extensively is because there are several hundred thousand cars built annually in which fans are so connected as to develop a speed of from 2000 to 2500 r.p.m. when the car speed is 20 m.p.h. over the ground. These cars, most of them, do not show a heating tendency over smooth roads at that speed, but do when making from 30 to 40 m.p.h. or when the motor is doing the same amount of work in one of the low gears. Then, at just the right time when the cooling agents are most in demand, the fan is either slipping or using an amount of power not at all commensurate with its cooling power.

Following immediately in the trail of power consumption at high speeds comes the objection to the noise made at those same speeds. In fan practice both in the ventilating trade and in the automobile trade, it has been pretty well proved that all fans become noisy when their tip speeds exceed 5000 f.p.m. At any speed beyond that point there is bound to be noise, and to a more or less marked degree and the noise increases with the speed.

When a car is racing at 35 or 45 m.p.h. the parties driving are too busy to notice the objectionable noises, but when the same car rolls down a smooth city boulevard at 20 m.p.h. and all of the other mechanisms are practically noiseless, it is somewhat incongruous to have a little 2 or 3-lb. fan making all the fuss.

The demand on the part of engineers who build our standard cars is daily becoming more insistent for less noise from the direction of the fan. The only way for this demand to be met is to bring the fan speeds down to somewhere within reasonable limits, and thus cause improvements in several directions, some of which are mentioned further on.

The apparent obstacles in the way of a successful meeting of this demand is the fact that, generally speaking, fans in use today will not deliver much air until they are buzzing at tip speeds around 10,000 f.p.m.

Another objection to high speeds is the effect on the bearings. To the manufacturer of good ball and roller bearings, the mention of 3000 or 4000 r.p.m. carries no terrors. Still, conditions on an automobile that travels all kinds of roads are very different from and much more severe than conditions that obtain on a stationary machine operating in a dustproof housing in some building.

## NEW PLANT FOR DIAMOND T

Chicago, April 27—The new plant of the Diamond T Motor Car Co. is just being completed. The old plant has been operated day and night in an attempt to catch up with orders. The first buildings of the new factory cover only about 125,000 sq. ft. of the 10 acres controlled by the company. They are arranged so that stock rooms about 400 ft. long have openings to the loading platform every few feet, and service switches give freight facility.

The capital stock has been increased to $500,000. The sales force has been reorganized with F. J. Pardee at the head. J. S. Conroy has been appointed district sales manager. J. P. Burris, who has just resigned from the Packard Motor Car Co., will take charge of all national business for the company.

## HYDRAULIC TRANSMISSION CAR

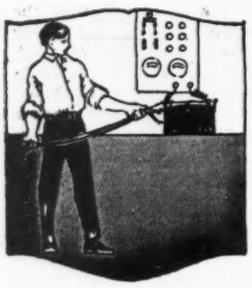
Chicago, April 27—A new concern, known as the Oak Mfg. Co., has been organized in Chicago to manufacture a six-cylinder passenger car, which is featured by a hydraulic transmission and a rotary-sleeve engine of the Argyll type. The offices are located at present at 108 South La Salle street. According to S. O. D'Orlow, designer, the new car will sell at about $1,560.

## FRANCE FEELS FUEL SHORTAGE

Chicago, April 29—According to a cable received by the Chicago Daily News, strict measures are being taken by the French minister of supplies, M. Violette, to conserve the use of gasoline. Only 8 gals. a week are allowed for motor cars which do not come under the category of public interest, such as taxicabs, ambulances, etc. These cars are allowed 14 gals.

It is not considered likely that the decree prohibiting touring will be recalled. A pass is necessary for a motor car to go beyond the gates of Paris and absolutely no pass is granted to cross the frontier of the department of Seine and Oise.

These restrictions are not in favor with owners of passenger cars, who see no reason for restriction if they use only their allotment of gasoline. Commercial travelers who had been obliged to rely on transportation via motor are the greatest sufferers on account of the reduction and suppression of train service.



# Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

*Editor's Note—Herewith is presented the forty-first installment of a weekly series of articles begun in* MOTOR AGE *issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journa' Co., Chicago, in a size to fit the pocket conveniently.*

*The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a batery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage bateries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.*

## Part XLI—Combining Starting, Lighting and Ignition

THE generator and motor are combined in a single unit in a number of different ways. Instead of having two separate machines, they may be combined in the same frame, but each have a distinct field and armature of its own. An example of a combination of motor and generator in the same frame is shown in Fig. 238. In reality this combination is in itself a two-unit system, as the generator and motor actions are entirely independent of each other. The type of construction shown in Fig. 238 is called the double-deck arrangement.

Another method of combining the generator and motor actions is to provide two separate windings on the armature of the same machine, one winding being the generator winding and the other the motor winding. This combination of motor and generator in a single machine is called a dynamotor—sometimes, motor-generator. Each of the armature windings is provided with a separate commutator and brushes. A machine of this kind is shown diagrammatically in Fig. 239, both commutators in this particular case being on the same end of the armature. When operating as a motor the machines usually drive through a gear on the flywheel, intermediate gear, or by silent chain to the crankshaft. When operating as a generator, the machine is usually driven by the timing gears or by means of a silent chain.

### Single-Unit System

Single-unit, or unit, systems are those in which the starting, lighting and ignition are all taken care of by the same machine. This consists of a dynamotor which has a contact breaker, induction coil and distributor fitted to its generator end. A complete system of this kind is shown diagrammatically in Fig. 240.

### General Classification of Systems

There are three general systems employed for wiring a car, as follows: The single wire or grounded return, the two-wire, and the three-wire system, respectively.

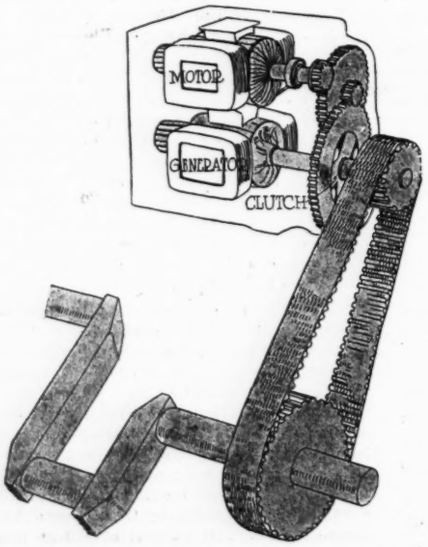



*Fig. 238—Double-deck arrangement of motor and generator in same frame*

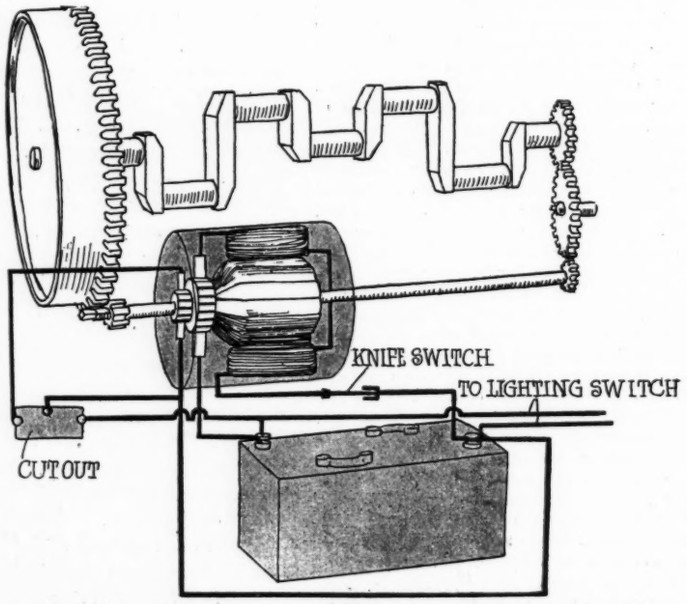



*Fig. 239—Application of a dynamotor in a two-unit system. It has two separate windings*

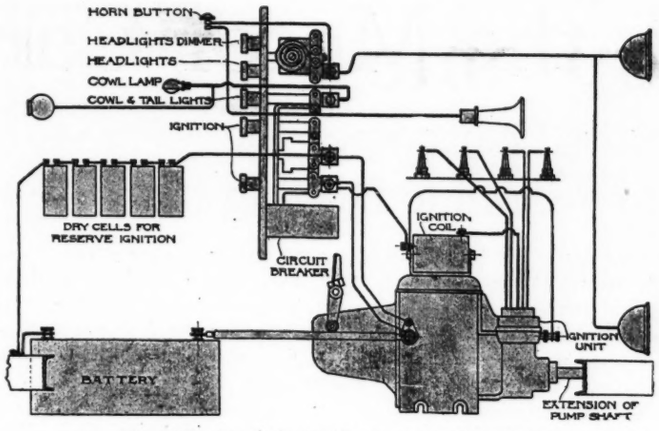



*Fig. 240—Typical single, or one-unit, system*

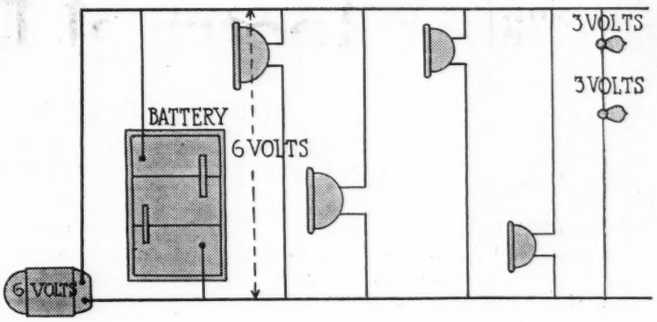



*Fig. 243—Two-wire system. Both sides of the circuit are insulated from the frame of the car*

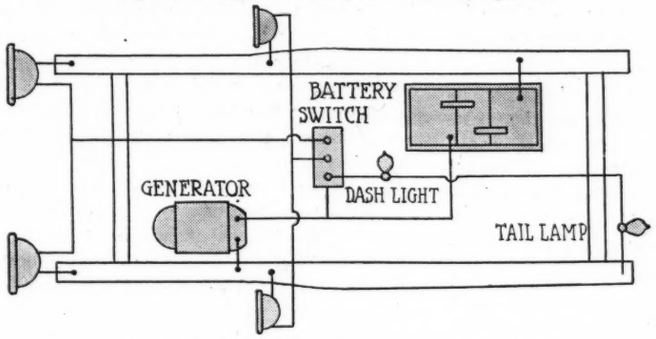



*Fig. 241—Single wire, or ground return, system*

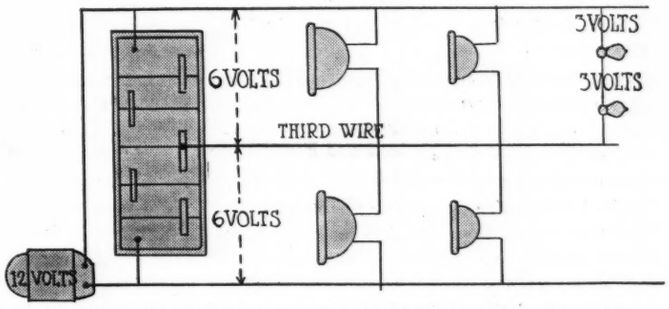



*Fig. 244—Three-wire system, one of which wires is known as the neutral*

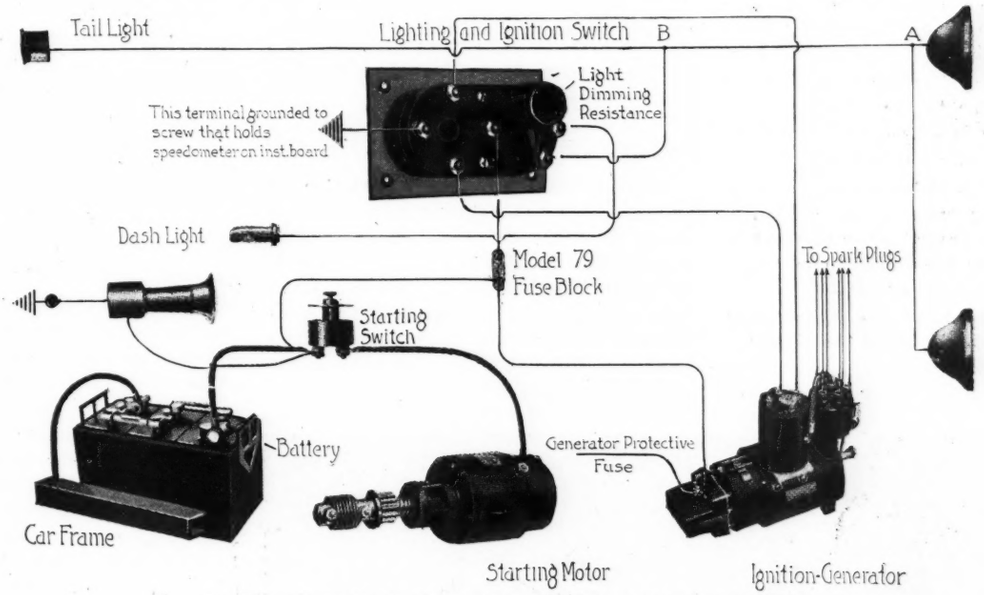



*Fig. 242—Remy single wire, or ground return, system as applied to an Oakland 32*

**In the single-wire** or grounded return system the various electrical circuits are completed by using the frame of the car as a part of the circuit, as shown diagrammatically in Fig. 241. A pictorial diagram of an actual installation of this kind is shown in Fig. 242. This is a Remy installation on an Oakland Model 32 car. Great care should be exercised in making the electrical connection to the frame of the car to see that it is as perfect as possible, and not likely to work loose or be affected by corrosion due to moisture or acid fumes. In some systems the positive terminal of the battery is grounded, while in others it is the negative terminal, no uniform practice being followed in this respect.

In the two-wire system both sides of the electrical circuit are insulated from the frame of the car, and the electrical circuits are completed by conductors specially provided for this purpose. Such a system is shown diagrammatically in Fig. 243.

**The three-wire system** consists of three wires, one known as the neutral, and arranged as shown diagrammatically in Fig. 244. The middle, or neutral, wire divides the battery into two parts, and the lamps and other electrical equipment may be connected between either of the outside wires and the neutral or between the outside wires. When the lamps are connected as shown in Fig. 244, if the fuse blows on one side the lamps on the other side still remain lighted. A good example of an installation of this kind is found in certain types of the U. S. L. systems. In these installations the connections of the starting switch are such that the two sections of the battery are in parallel when operating the starting motor and in series the remainder of the time.

# Seven Years with the Motor Car

## How One Woman Has Overcome the Timidity Tradition as to Feminine Driving

TIMIDITY is the great drawback to a woman who drives, or wants to drive, a car. But timidity can be overcome, and there is no better example of the truth of this assertion than that made by a dealer at De Kalb, Ill., who for seven years has sold cars, has taught beginners to run them and has taken part in competitive runs with more than ordinary success.

This dealer is a woman, and therein lies the tale.

Did she know anything, or much, about cars to start with? She did not. She will tell you so herself, just as she told a member of the MOTOR AGE staff Saturday between calls to the telephone and from customers who came in to ask about accessories and cars. That she has learned much since she began on that eventful first year of salesmanship seven annums ago perhaps some of the hundred or more persons she has taught to drive might bear witness.

"My experience is that the woman who begins to learn to run a car should learn to pay attention to the car and also to stop the first thing," is Mrs. G. H. Deane's advice in response to the question as to whether timidity is such a factor in driving from the woman's viewpoint.

Women are quick to learn how, but they don't know why very often, she says. However, she has never had an accident in teaching women to drive, and she has never had an accident herself except—

It was a peaceful resident of the country who wandered amiably along the highway, no doubt enjoying the great outdoors as much as did those of higher station, who could boast the car's swift transport. Mrs. Deane was on the highway also, though she was not wandering amiably along. She was in her car, and if there is anything Mrs. Deane does not do when she is at the wheel it is wander. You can't wander far from the crow's flight if you like speed, and Mrs. Deane likes speed. Well, the car came out minus a fender and part of a side, but the cow "wasn't able to navigate" any longer.

That was a long time ago, however, as accidents go, and it surely can be overlooked since there are so many other things to prove that ability and not timidity is found here. For Mrs. Deane is a prize winner. In 1911, if we may go back that far just for a second, there was a prize for a parade of a floral nature, and the next year came the long run in which she won two prizes, besides establishing permanently her place as a driver.

### *From the Woman's Viewpoint*

In 1912 the State Fair Association of Illinois held a non-motor stop run in which there were fourteen contestants. Mrs. Deane was one. For 14 hrs., for 351 miles, she drove her Case 40, the car which she then was selling, without a stop. Two hours of the run was through rain. The route was through Chicago and down the state to Springfield, with plentiful checking in at clubs and newspaper offices. From the state Mrs. Deane received a silver medal for her record, and another prize was given to her by the Automobile Blue Book Pub. Co., which had offered it for the woman who drove the longest distance.

All garages were in barns when Mrs. Deane first went into the business. Today she is partner in a firm that has a garage that can store 100 cars at once and that knows as many as thirty-five cars in one night during the tourist season. But she began in a barn. How she began is a story in itself.

For several years Mr. and Mrs. Deane had been travelers in a way, owing to the nature of Mr. Deane's business. Then Mrs. Deane decided she wanted to stop traveling, and she began selling the two-cylinder Maxwell with a barn as garage. Mr. Deane was supervising the laying of some underground telephone work then, and for a while Mrs. Deane, even though she had started with knowing practically nothing about motor cars, was in the business alone. Then Mr. Deane gave up his position and the two have been selling cars at De Kalb ever since until now the sign of "Deane's," in which both equally are interested, in effort especially, is a landmark to motorists who follow the Lincoln highway through that part of Illinois.

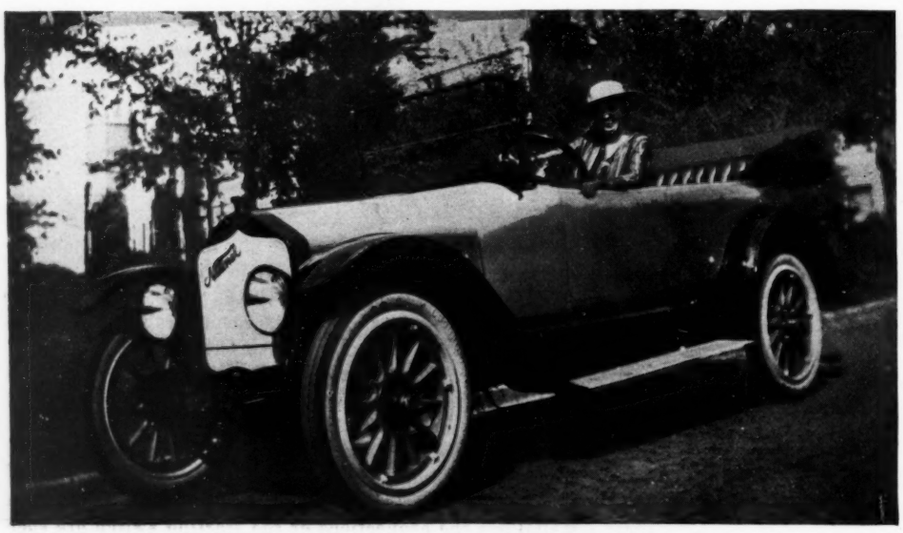
**Learned Car Gradually**

Besides the Maxwell in those early days, Mrs. Deane sold the Oldsmobile. In fact, she has been selling the Oldsmobile ever since. Now she has the National also, and her own car is a National six.

When asked how she learned to know the car, whether gradually or in a short time, Mrs. Deane said it was rather gradual. She read books on mechanical subjects the first year, among them the books in the Pennsylvania course. To-day she is sure she could make any ordinary repairs on a car, and it is unnecessary for her to make any other kind. As she does not abuse her cars, however, she has very little repair work for anyone.

You may have met Mrs. Deane at the Coliseum during the motor car shows in Chicago. She began selling cars there the first year she went into the business. So she has been selling cars at the national show seven years.

Naturally, Mrs. Deane has taught most of the women in De Kalb who drive. Some of them were easy to teach, and some were not, but the rule of averages works everywhere, and she found on the whole that after the beginner once learned to pay at-



**Mrs. G. H. Deane, seven years a dealer at DeKalb, Ill. This picture was taken in front of the state normal school in her town**

tention to the car instead of looking all around the rest came in due time.

Three doctors in De Kalb are teaching Red Cross work to the women of the town. There are enough women who drive there to form a motor ambulance company. Whether they will have that chance or not Mrs. Deane isn't so sure, but she is sure that it is a good thing for women to learn to know the motor car and to get acquainted with it mechanically.

There are few women who give their entire time to selling cars, even though they may demonstrate from time to time for some agency. Mrs. Deane is one of two women whom Illinois dealers say are the only two such in the state. She gives all her time to the work, knows the business thoroughly and does all her own demonstrating. When she brought her personal car to De Kalb she did it like she does a prospect, she went after it. The 300-mile drive proved only a day's run for her, and she brought it home from the National factory at Indianapolis without trouble.

That she finds herself in a job that fits can be indicated in a few words as to the garage and agency in which she is a partner. The town of De Kalb has 12,000 inhabitants. The Deanes sell high priced cars. Yet, for the last four years fifty has been the average each year for sales.

**The garage which doesn't even remember the barn in which Mrs Deane started business with a two-cylinder Maxwell**

## Everybody's Doing it—Training for War

FROM the huge organizations of the motor factories down to the small town of a few thousand, every woman citizen of the United States is planning and working to do her bit for the country. And as the motor car enters into so many plans and actions nowadays, what is more natural than that they should be planning to service in company with friend motor car?

The women and girls at the Goodyear factory at Akron, O., have adopted the preparedness spirit of the workers in France and England to such an extent that khaki is appearing in the working garments there. It is said that the girls declare, war or no war, they are converted permanently to divided skirts for working hours because of the freedom of movements and the additional fact that a simple uniform of this kind enables them to save their regular feminine raiment.

But how about the ambulance drivers?

A branch of the National League of Women's Service is to be organized in every county in Michigan. Instruction in motor truck driving and repairing is being given to women at Detroit now.

Fifty Seattle, Wash., women meet every week in the salesroom of the N. S. Brigham Co., Cadillac and Scripps-Booth distributor, to study the care of the motor car. Mrs. C. W. Wharton, president of the Women's Roosevelt Club of Seattle, organized the company and is captain.

Fifty Kansas City women have enlisted in the school started by the National League for Women's Service at Kansas City, Mo. The school is at the polytechnic institute. All applicants must know how to operate cars.

The women at Wilmington, Del., have formed a motor ambulance class with instruction from the Foss-Hughes Motor Co., dealer.

More than 100 Los Angeles women are ready to give their services and their motor cars immediately on call from military officials. The offer was made through the Automobile Club of Southern California.

At Wichita, Kan., a class of this kind includes chiefly members of the Wichita Equal Suffrage Association. Two meetings a week are held at the Cadillac Sales and Service Station.

It is a fact worthy of comment that most of the women entering these classes know how to drive their own cars but do not know the why of driving. This brings us back to Mrs. Deane's criticism of women driving, a criticism made with seven years' experience in selling to women and in teaching them to drive. It may be, as many say in noticing organizations of this kind, that it will not be necessary for women to drive motor cars over battlefields and carry wounded through shot-filled roads, but it will have a certain result and that one a result that will affect the motor industry mightily, there is little doubt. The woman driver will know the mechanical side of the car, and the feminine element will be the subject for even more consideration by the maker of the car and the man who sells the finished product.

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Boston, Mass., April 27—A. H. Sowers, New England distributor for the Jackson cars, evolved a plan to do his share in aiding the war movement that broke in the United States.

He wrote letters to the Bay State A. A., the Safety First Committee of Massachusetts and Commander Rush at the Navy Yard, in which he offered to have his demonstrator teach any woman, soldiers or sailors who were sent to him by the officials how to drive motor cars, so that they might fill in where there were cars available without drivers. The matter is now under consideration, and it is probable the Boston Automobile Dealers' Association will take the matter up and all dealers do the same. In this way many soldiers, sailors and others will be trained to handle cars in an emergency.

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Detroit, April 27—The Executive Club of the Detroit Board of Commerce has taken steps to enroll 12,000 women for industrial work. The plan is to place the women in places vacated by those men called to the front. This is a war emergency measure to fill the places in factories, munition plants and other industrial lines in Detroit that are in need of labor. Manufacturers already are beginning to plan rearrangements of buildings and departments to enable them to employ women in place of men called to war.

## To Market, to Market, With Aid of the Car

NOW they're trying to make the American woman and the motor car save the country from starvation. Or words to that effect. At any rate, the Regal's sales manager suggests that the two in combination can do more to lessen the high cost of living during the coming summer and fall than many of the potato-patch schemes suggested in various parts of the country.

For instance. Suppose your town has a central market place where fresh vegetables can be purchased at a saving but the housewife could save more by trips to the country. Wouldn't a car come in handy there? The wife could go sailing—figurative for motoring—in the country and bring back a week's supply at one time. making a joy ride of the matter at the same time. Then in the fall, when potatoes and onions try to hit the sky, they can be bought right in the field with more saving. No doubt more car owners will be trying this kind of savings bank this year than ever did before.

# The Readers' Clearing House

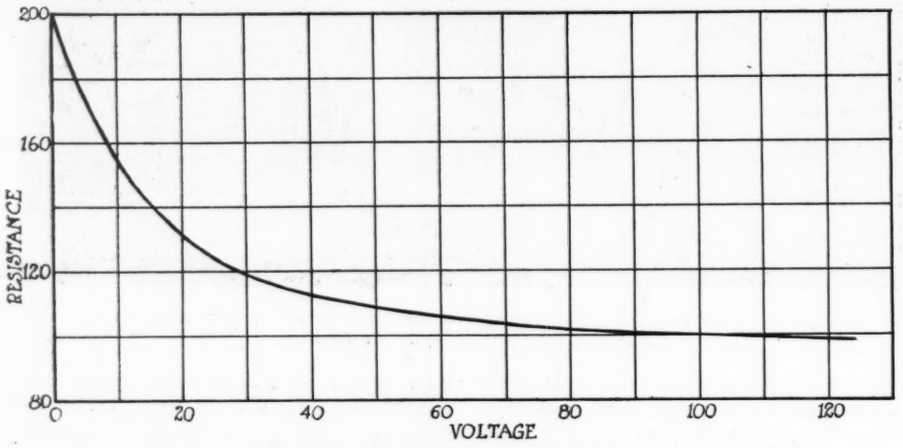



*Fig. 1—Curve showing relation of resistance to voltage in problem presented by H. A. Noa*

## LAMP RESISTANCE IN 110-V. LINE

### Assume That Current Is Direct Instead of Alternating

STRAW PLAINS, Tenn.—Editor MOTOR AGE—How many 32 c.p. carbon lamps would have to be used in connection with a 110-volt circuit to charge a 12-volt battery? The battery is marked 3-12 a cap 5 amps. for 8.4 hrs. Amperes charge rate—start 7, finish 2. How long will it take to charge?—H. A. Noa.

We assume that the 110-volt circuit is direct current as it would be impossible to use it in charging a storage battery if it was alternating current unless some kind of a rectifier be used to change it to direct current. Assuming that the voltage of each of the cells is 2 volts when they are first put on charge at the rate of 7 amp. then the total voltage of the six cells or the entire battery will be 12 volts. The voltage of the battery opposes the voltage of the circuit to which the battery is connected and it is the difference in their voltages which produces the charging current. This difference in voltage for this particular case is equal to 110 minus 12 or 98 volts when the battery starts to charge. This voltage is to produce a current of 7 amp. through a resistance composed of a number of 32 cp. 110-volt lamps connected in parallel, and the value of this resistance will be equal to 98 divided by 7, which gives 14 ohms.

The resistance of a carbon filament lamp is not the same for all voltages, as a change in voltage causes a change in the current, which results in a change in temperature and this causes a change in the resistance of the lamp, the resistance increasing with a decrease in voltage. The relation between resistance and voltage for a 32 cp. 110-volt carbon filament lamp is given in the curve in Fig. 1. Lamps of the same rating will, of course, vary among themselves and the ones you use may differ slightly from the results obtained from the curve. In connecting a number of equal resistances, such as lamps in parallel, you will get a total resistance which is equal in value to the resistance of one of the lamps divided by the number connected.

We know the resistance of a certain number of 32 cp. connected in parallel is to be 14 ohms when they are operating at 98 volts. The number of lamps required will be equal to the resistance of one lamp at 98 volts, which is equal to 100 ohms as taken from the curve, divided by the total resistance of the lamps, or 14 ohms, which gives 7.1 as the number of lamps. Of course, a whole number of lamps will have to be used so we will select 7 as the proper number to start with. As the battery continues to charge its voltage will increase and there will be a decrease in current unless the resistance be lowered by adding more lamps. It is good practice to allow the current to decrease in value as the condition of charge of the battery approaches its completion and it may be necessary to increase the resistance by decreasing the number of lamps. The required changes in the resistance of the lamps in order to bring about the proper change in the charging current while the battery is charging will depend upon the change in value of the difference between the line voltage and the voltage of the battery.

The time required to charge a storage battery will depend upon its ampere-hour capacity and the charging rate at which it is charged. Thus, if a battery is capable of delivering 5 amp. for a period of 8 hr., its ampere-hour capacity will be equal to 5 times 8, which gives 40 amp.-hr. A storage battery is not 100 percent efficient; that is, it will not deliver back to a cir-

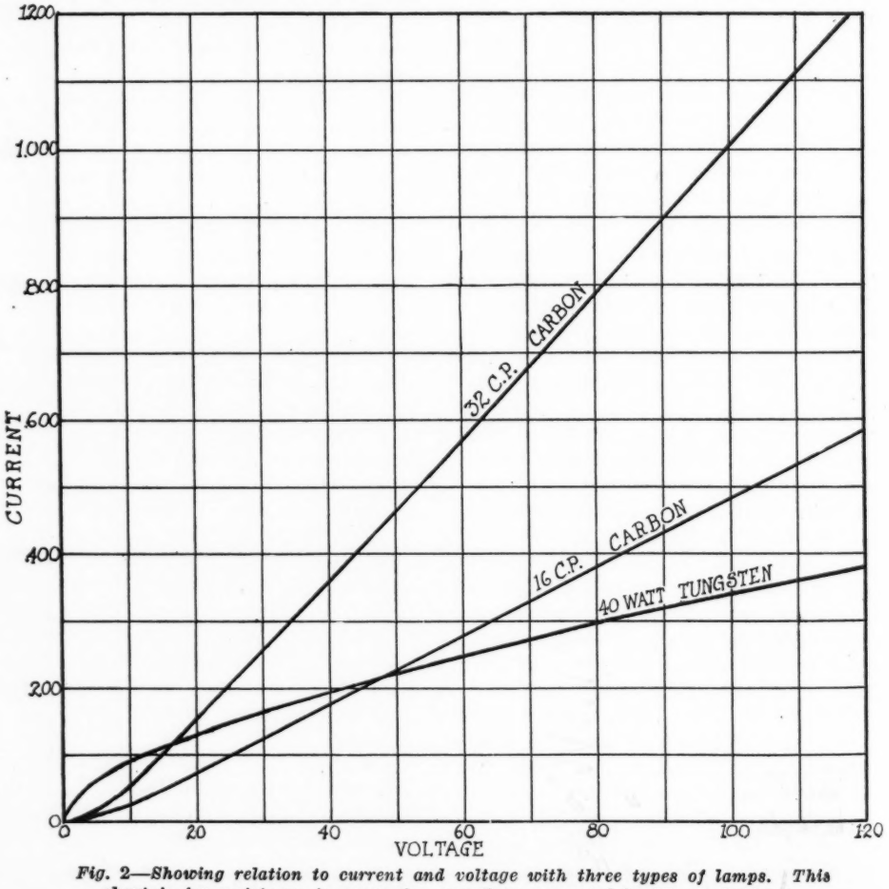



***Fig. 2—Showing relation to current and voltage with three types of lamps. This chart is for assistance in answering questions presented by W. H. Kellen***

cuit all the voltage that is put into the battery.

Assuming an efficiency of 70 percent, then 40 amp.-hr., which is the output, will represent 70 percent of the input or the input will be equal to 58 amp.-hr. If you start to charge at the rate of 7 amp. and end up at a rate of 2 amp. and assuming the charging current decreases quite uniformly during the charging period, then the average charging current will be 4.5 amp. The time required will then be equal to 58 divided by 4.5, which gives a little less than 13 hr.

### 40-VOLT DYNAMOS—6-VOLT BATTERY
**How to Step Down Voltage by Putting Lamps in Circuit**

Beloit, Kan.—Editor MOTOR AGE—I have a 40-volt dynamo which is used for charging a 32-volt lighting system. I want to charge 6-volt storage batteries with it. Can I reduce the voltage by using lamps in series? Show by diagram the proper method of connecting. —D. M. Van Pelt.

The proper method of connecting your 6-volt storage battery to a 40-volt circuit is shown in Fig. 3. A number of lamps may be connected in parallel by mounting several porcelain lamp sockets on a board and connecting the terminals of these sockets to two binding posts B1 and B2 as shown in the figure. An ammeter is shown connected in series which will enable you to determine the value of the charging. The current in the circuit will depend upon the voltage at the source or switch which has in this case been assumed as 40 volts, the counter voltage or pressure of the battery and the resistance of the entire circuit.

The difference between the 40 volts and 7.5 volts, which would correspond to about the voltage of the battery when it is on charge, is 32.5 volts. This voltage is to be used in producing the charging current and must overcome the resistance of the circuit. The resistance of the wires and the internal resistance of the battery is quite small in comparison to the resistance of the lamps, hence we may assume the lamps constitute practically the entire resistance.

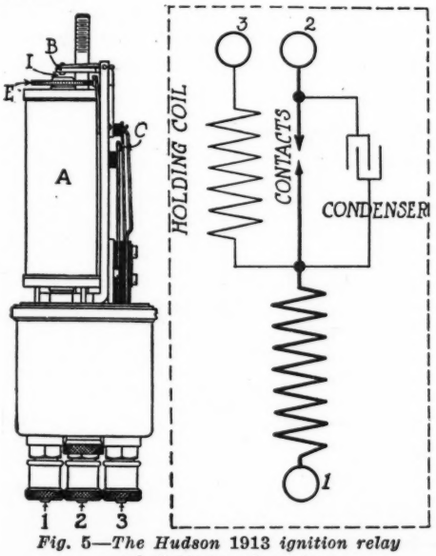



*Fig. 5—The Hudson 1913 ignition relay and its internal wiring*

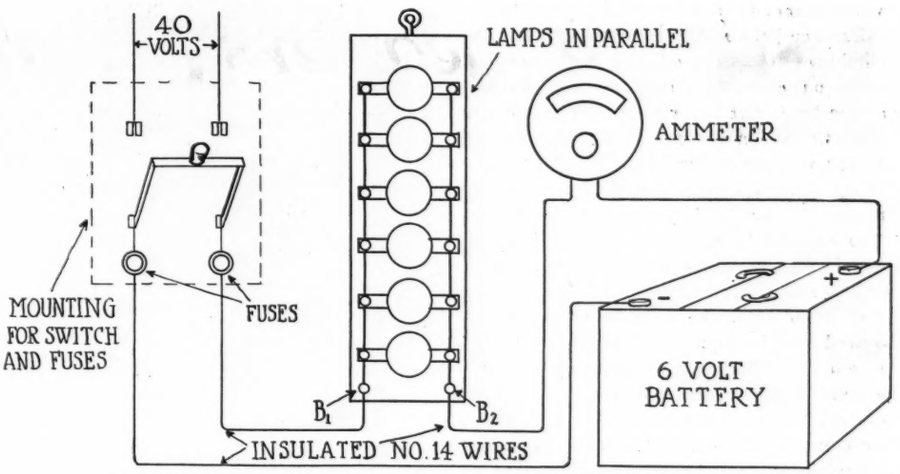



*Fig. 3—Layout for charging 6-volt battery from 40-volt direct-current circuit*

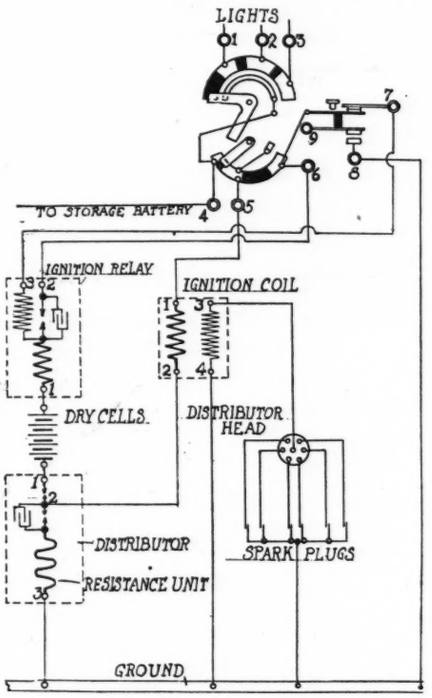



*Fig. 4—Layout of Delco system on 1913 Hudson to explain operation of ignition relay*

Assuming a charging current of 5 amp. then the resistance will be equal to 32.5 divided by 5 or 6.5 ohms. This represents the resistance between the terminals B1 and B2 and it may be adjusted to approximately this value by carrying the number of lamps. The more lamps that are connected the less the resistance between B1 and B2 and likewise the fewer the number of lamps the higher the resistance.

The resistance of lamps of a certain voltage rating will depend upon the kind of filament they have, whether it is carbon, tungsten, etc., their rated candle power, and the voltage at which they are actually operated. High candle power carbon-filament lamps will offer less resistance than any of the others and for this reason a smaller number of this kind will be required than if some other kind, such as tungsten be used. If two or more batteries be charged at the same time by connecting them in series, then the resistance of the circuit must be lowered, in order to maintain the charging current, which may be done by increasing the number of lamps. A little experience will enable you to make these adjustments quite easily.

### DETERMINING CHARGE RESISTANCE
**Lamps Necessary for Various Numbers of Batteries**

Cecilia, Ky.—Editor MOTOR AGE—I am installing a charging system, using 110-volt D. C., taken from the lighting system, with carbon-filament lamps for resistance. Is there a fixed rule for determinning the exact amount of resistance to use when charging one, two or more batteries, or, in other words, the exact number of lamps, say, 32 c.p.

I have been told that one 32 c.p. carbon-filament lamp will allow one ampere to pass through the battery, using six 32 c.p. lamps, would allow six amperes to flow through the battery. If same be true a 6-volt, 60 ampere hour battery would require six such lamps to charge at a rate of 6 amps. per hour, or two 6-volt, 60 amp. hour batteries of 6 amps. per hour, and so on.

Is this correct? If not, advise me just how I can determine the amount of resistance?—W. H. Kellen.

Your statement about one 32 cp. carbon filament lamp allowing approximately 1 amp. to pass through it, is quite correct, provided the voltage acting on the lamp is approximately 110 volts. The resistance of the carbon filament of a lamp changes with a change in the value of the current the lamp is carrying. This change in resistance is due to a change in temperature which increases with an increase in current and decreases with a decrease in current.

The resistance of the filament of a carbon lamp, however, decreases with an increase in temperature and increases with a decrease in temperature. Now the current sent through the lamp will depend upon the voltage applied to the lamps. The relation between current and voltage for several different kinds of lamps is shown in the accompanying figure. It is interesting to note that the current taken by a tungsten lamp at first rises quite rapidly with an increase in voltage, which is just the opposite of the carbon lamp. You must bear in mind that there may be quite a little difference in the current taken by different lamps of the same kind and same rating.

In charging your storage battery, the

voltage over the lamps will be equal to the difference between the line voltage and the combined voltages of the batteries you have on charge. Assuming you have a single three-cell battery on charge and you wish to send a current of 6 amp. through it, the voltage of the battery will be something like 7.5 volts, which leaves 110 minus 7.5 or 102.5 volts for the lamps. The current taken by one 32 cp. lamp at 102.5 volts, as given by the curve, Fig. 2, is 1.03 amperes, and in order to have a current of 6 amp. the number of lamps required will be equal to 6 divided by 1.03, which gives 5.82. It is impossible to use a fractional number of lamps, but a nearer correct value of current may be obtained by using one 32 cp. and ten 16 cp. carbon lamps, which will give a total current of 5.98 amp. at 102.5 volts as taken from the curves.

If five batteries, each having a terminal voltage of 7.5 volts, be on charge, the voltage over the lamps will be equal to 110 minus 37.5, which gives 72.5 volts. In this case at least nine 32 cp. carbon lamps will be required, which will give a current of 6.3 amperes as taken from the curve.

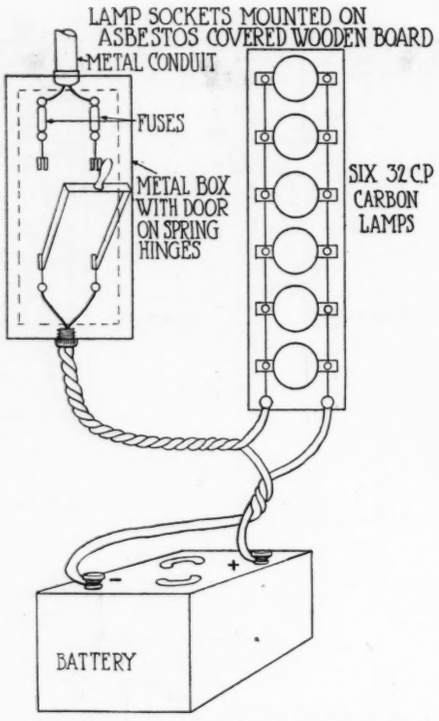

LAMP SOCKETS MOUNTED ON ASBESTOS COVERED WOODEN BOARD
METAL CONDUIT
FUSES
METAL BOX WITH DOOR ON SPRING HINGES
SIX 32 CP CARBON LAMPS
BATTERY

*Fig. 6—Charging outfit for 6-volt battery using 110-volt direct-current line*

## OPERATION OF AN IGNITION RELAY

### How Electrical Instrument on 1913 Hudson Works

Fayetteville, Ark.—Editor MOTOR AGE—What is the bore and stroke of the engine on Hudson Model 37, 1913?
2—What is the brake horsepower?
3—Explain how the ignition relay on this model works.—Leland Stoffer.

1—The bore and stroke of the Hudson 37 motor is 4⅛ by 5¼ in.

2—The brake hp. is 42.

3—The ignition relay is connected into the dry battery circuit and serves to interrupt the primary ignition circuit and so produce a high-tension flow in the secondary and establish a spark at the plugs. The relay is connected to the ignition coil and distributor in two ways as illustrated in Figs. 3 and 4.

Refer to Figs. 1 and 2. The relay consists of a set of contacts operated by an electro-magnet having two windings, one of comparatively coarse wire, so connected that the current ceases to flow through it when the contacts C are open, and the other of comparatively fine wire connected to the contacts C in such a way as to hold the armature of the relay open after the circuit in the course-wire winding is opened at the contacts C. This coil is known as the holding coil. A condenser is also connected around the contacts C to suppress the arc, and to thus increase the speed with which the arc between these contacts is broken.

The operation of the relay varies with the connection to the external circuit slightly, and this operation will be discussed under the following heads:

See Fig. 3. The contacts C of the relay and the coil A are in series with a special set of timber contacts on the dual distributer. When these contacts are closed, by the revolving of the fibre timing cam, current passes through the ignition coil and the timer contacts and contacts C of the relay and through coil A, energizing the latter.

This immediately causes the armature to open, thus interrupting the primary circuit and causing a spark at the spark plug. As soon as the circuit is interrupted, coil A is de-energized, and contacts C open again and this is repeated indefinitely, giving a vibrating spark all the time that the timer contacts are together.

This occurs only, however, when the circuit between the terminals No. 6 and 7 on the combination ignition and lighting switch is open. This is accomplished by pressing the starting button.

Now, if it is desired to get just a single spark, the holding coil is energized, and when the armature touches the core, it will be held there, so that a single spark similar to that furnished by generator or storage-battery ignition will be obtained.

This coil is energized when the circuit between terminals No. 6 and 7 on the combination ignition and lighting switch is closed. This is done by releasing the starting button.

### Inquiries Received and Communications Answered

| | |
|---|---|
| H. A. Noa | Straw Plains, Tenn. |
| D. M. Van Pelt | Beloit, Kans. |
| W. H. Kellen | Cecilia, Ky. |
| Leland Stoffer | Fayetteville, Ky. |
| A. I. Roberts | Pleasant Hill, Ill. |
| Ed Brooks | Beloit, Wis. |
| R. D. Widemeyer | Dallas, Tex. |
| C. S. Jensen | Moville, Iowa |
| F. A. Parker | Des Moines, Iowa |
| Charles Mahe | Farnamville, Iowa |
| A. O. Ohrmund | Milwaukee, Wis. |
| A Reader | Evansville, Ind. |
| Arnold | Berwick, S. D. |
| C. L. Scott | Corinth, N. Y. |
| J. W. Clower | Kansas City, Mo. |
| Bob Masumoto | Seattle, Wash. |
| R. E. Lindsey | Champaign, Ill. |
| Claron Meldrum | Alton, Ill. |
| H. C. McNutt | Tupelo, Miss. |
| A Reader | Newman, Ill. |
| Almon Berg | Lennys, Mont. |

## HOW TO MAKE CHARGING OUTFIT

### Illustration and Description of Direct-current Device

Pleasant Hill, Ill.—Editor MOTOR AGE—How can I rig up a charging outfit to charge a 6-volt storage battery from a 110-volt city lighting system. I want an inexpensive system to charge my own battery. I have a small transformer that steps a 110-volt system from 0 to 27 volts. Can I use it? If so, publish a sketch. I understand such an outfit can be rigged up by using several lamps wired in series, but I don't know how to connect it.—A. I. Roberts.

You failed to state definitely the kind of current available; that is, whether it was direct or alternating. If it is alternating current you cannot charge your storage battery without the use of some kind of a rectifier for changing it into direct current. The transformer is for the purpose of transforming from a current of one voltage to the same kind of a current of different voltage. The transformer will work only in connection with an alternating current circuit. You can transform the

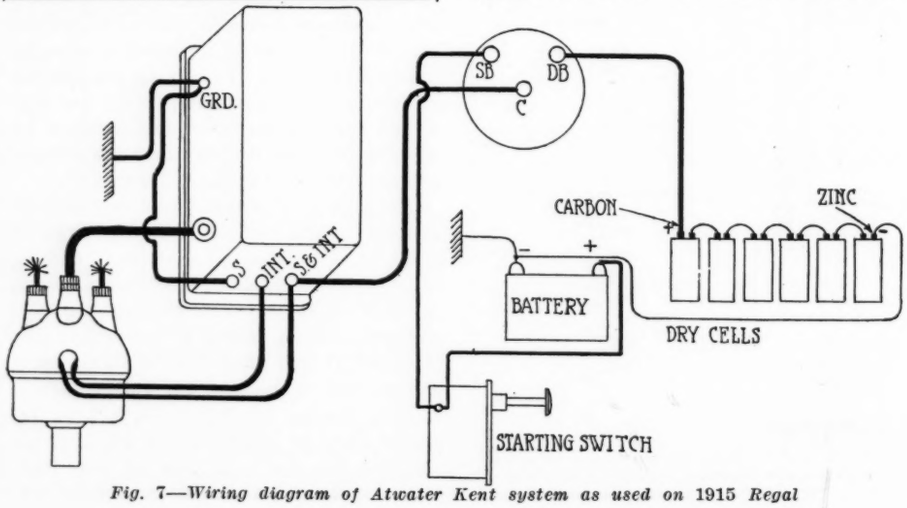



*Fig. 7—Wiring diagram of Atwater Kent system as used on 1915 Regal*

alternating current into direct current by means of a home-made electrolytic rectifier. The construction of an inexpensive rectifier of this type will be given in MOTOR AGE in the near future.

If the current available is direct then you can charge your battery by connecting it to the circuit as shown diagrammatically in the accompanying figure. Six carbon filament lamps are shown connected in parallel with each other and the combination is in series with the battery. Each lamp will represent a charging current of about one ampere, when a single battery of three cells is being charged. The current may be adjusted by varying the number of lamps.

Be sure to connect the positive terminal of the charging circuit to the positive terminal of your battery as otherwise you will discharge rather than charge your battery. The polarity of the charging circuit may be determined by immersing the bared ends of two wires, which have their other ends connected to the circuit, in a vessel of water, being careful to keep the ends some distance apart so as to prevent a short circuit. Bubbles of gas will rise from about the ends of the wires but considerable more gas will be given off about the negative terminal than is given off about the positive terminal. This negative wire should be connected to the negative terminal of the battery or the one marked with a dash.

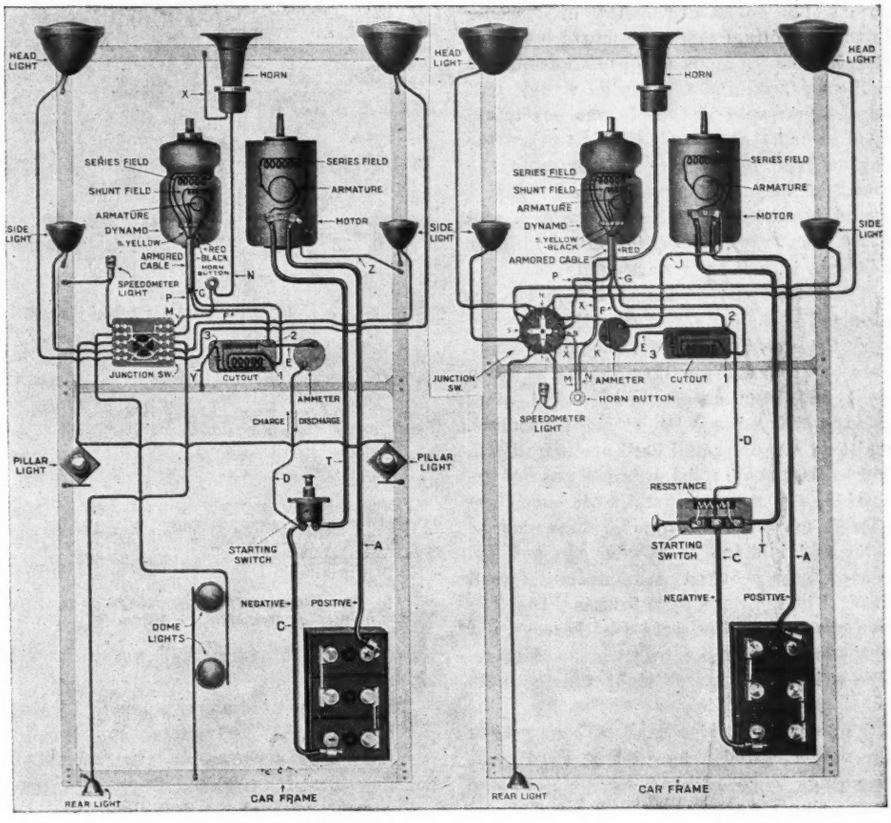



*Fig. 8—One-wire and two-wire electrical systems used on 1914 Paige cars*

### Wiring of 1912 Velie

Moville, Iowa—Editor MOTOR AGE—Show the wiring diagram of the 1912 Velie 40 H.P. ar. It has a Splitdorf low-tension magneto of the Dual type, and also an Atwater Kent ystem. The wires have been changed so that I have been unable to get the current through the battery side on the magneto.—C S. Jensen.

The complete wiring as used on the 1912 Velie is shown in Fig. 9.

### Regal 1915 Wiring

Beloit, Wis.—Editor MOTOR AGE—Illustrate wiring of 1915 Model D. Regal with Rushmore Bosch starting motor and generator.—Ed. Brooks.

Printed in Fig. 13 is a diagram of the Rushmore Bosch starting and lighting system, and in Fig. 7 a diagram of the Atwater-Kent system as used on this car.

### DIAGRAMS OF WIRING ON PAIGE

#### 1914 Models Used Both Two-Wire and Ground Systems

Dallas, Tex.—Editor MOTOR AGE—Give me a wiring diagram for the Gray & Davis starting and lighting system as used on a 1914 Paige. Also give me the rate of charge at starting and finishing in amperes. The battery is a Willard 6V-80A type.

2—Where is the best place to cut in a voltmeter. The system now has an ammeter, but I also want a voltmeter.—R. D. Widmeyer.

1—The wiring diagram you ask for is published in Fig 8 or in Fig. 8A. Inasmuch as you do not state the car number we cannot tell whether it is in the first, second or third series of this model. However, the cars up to No. 15000 used the two-wire assembly as shown in Fig. 8 and the cars above that number used the grounded system shown in Fig. 8A.

The rate of charge on a Willard 6V-80A type of battery is 10 amp. at starting and 4 amp. or below at finishing.

2—The voltmeter should be hitched into the same wire as the ammeter. A combination ammeter and voltmeter in place of the present ammeter and using the same wires would be a satisfactory equipment.

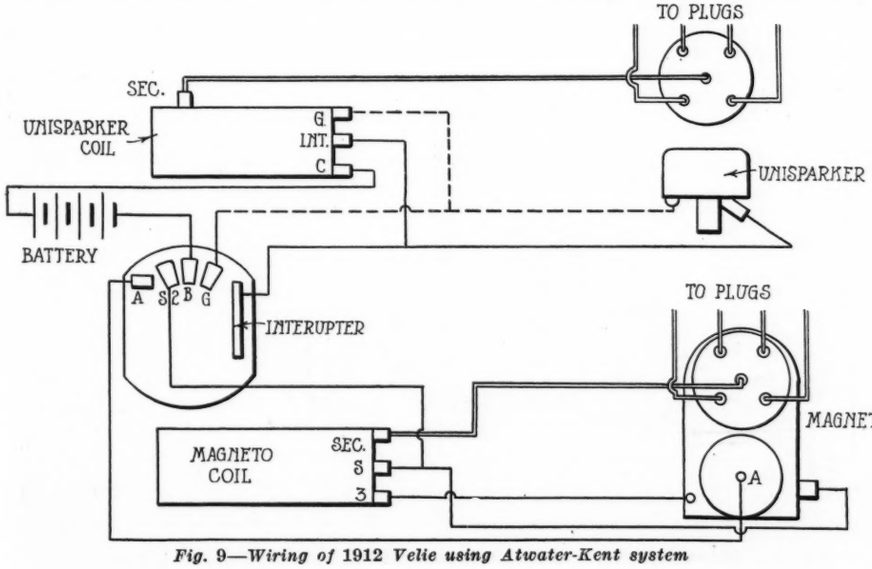



*Fig. 9—Wiring of 1912 Velie using Atwater-Kent system*

### TESTS WITH KEROSENE AS FUEL

#### Reader Uses Part Gasoline, Part Coal Oil in Stock Car

Des Moines, Ia.—Editor MOTOR AGE—Noting the various letters from kerosene users, I wish to offer my experience with this grade of fuel.

I am using a 1915 Ford roadster which has been used since October, 1915. Last November, after cleaning carbon, grinding valves and putting in new rings on bottom ring slots, I started using 33 per cent of the lowest grade of kerosene which I could get, which cost about 7 cents per gallon, and 67 per cent low grade gasoline, which cost 17 to 19 cents a gallon. The kerosene tested 37 and the gasoline 57. I used this proportion all winter and through 52 days of zero or colder weather, and had no trouble starting, excepting that during the most severe weather where the tempera-

ture would be 20 deg. below on starting in the morning, I made the practice of putting in about a quart of 70-test gasoline to a 10-gal. tank, and the engine would start on the first spin if the oil was not thickened so bad that it was difficult to turn the engine over at any rate of speed. In the event of the oil being thickened badly, I would then jack up one rear wheel, and could then throw the engine into high gear and spin it, and thus start easily.

The latter part of March I took the engine out of the car for overhauling. I found very little carbon in the combustion chambers or around the valves—about as much as I had been accustomed to find after driving 600 miles with straight gasoline, and this was not at all hard or crystallized. The carbon on the piston heads was not excessive, nor was it crystallized, but it appeared more like a gumbo, brownish in color and inclined to powder up, and appeared to be a baked accumulation of road dust. The bearings were in fine shape. The two connecting rods were a little loose, but not enough to make noise or do damage. The wrist pins were all right and the main bearings did not need any attention.

I proceeded to clean the carbon, ground the valves, fitted a new set of Ford oversize rings to each piston, tightened up the connecting rods, put in a new set of valve springs, a new commutator complete, am going to use the old commutator shell for a washboard, and called it a job.

**Ran Slowly at First**

Then I started the engine with the hose pouring a good stream of water through the radiator, keeping it filled all the time and running out of top and bottom, and let the engine run slowly for about an hour or so.

After this I took the machine out on the road and made about 100 miles at not over 20 to 25 m.p.h. on a tank of 37-test kerosene and 57-test gasoline, half and half, by which time new rings were becoming some good. With about 2 gal. of this left in the tank, I pulled up to an oil station and took 6 gal. of 37-test kerosene and a gallon and a half of 83-test gasoline and proceeded to make 120 miles on this mixtures at speeds of from 35 to 45 m.p.h. The rings were then getting in good shape. There was a temperature of about 32 above, a strong northwest wind and a light snow. The machine was running perfectly throughout this entire 120-mile run. The mileage on both fuel and oil was rather poor, however, but speed, hills and new rings had been unfavorable for much of a record in this respect, nor was the weather at all favorable.

I then decided to make a test for the last 75 miles of the trip on straight kerosene, so with a hot engine and into an empty tank, I placed 6 gal. of 37-test kerosene and made these 75 miles over very hilly country on the River-to-River road in a little less than two hours and with a fuel consumption of only 2 gal. of this fuel. When the car cooled off, I was unable to start it without using hot water on the carbureter.

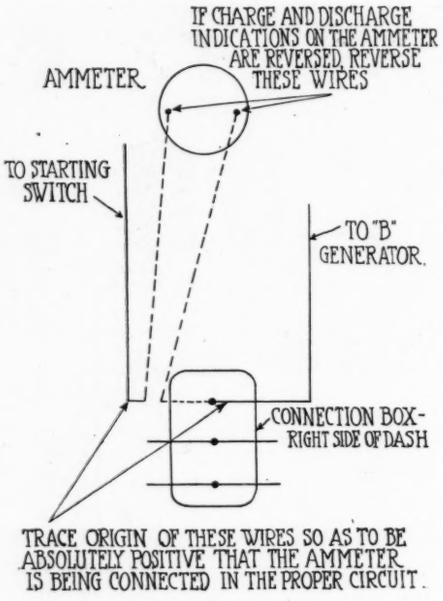

IF CHARGE AND DISCHARGE INDICATIONS ON THE AMMETER ARE REVERSED, REVERSE THESE WIRES
AMMETER
TO STARTING SWITCH
TO "B" GENERATOR
CONNECTION BOX-RIGHT SIDE OF DASH
TRACE ORIGIN OF THESE WIRES SO AS TO BE ABSOLUTELY POSITIVE THAT THE AMMETER IS BEING CONNECTED IN THE PROPER CIRCUIT

*Fig. 10—Diagram to show method of connecting ammeter to Chandler*

The radiator used about a quart of water per 100 miles, but had a small hose leak in it. The engine showed no symptoms of heating, in fact, appeared to be at a perfect temperature at all times.

The carbureter used was a plain Holly, and the same adjustments were made from the dash for all conditions of the trip as would be followed for gasoline straight, except that in burning the kerosene straight, I had to give it a very rich mixture for the hills unless I could hit them at sufficient speed to maintain at least 25 or 30 m.p.h. to their summit. The car is a stock job in every respect.

The conclusions which I have reached from this kerosene route are:

That to burn kerosene, good compression is imperative; ignition and other conditions normal. Any modern carbureter will handle straight kerosene at speeds above 25 m.p.h. as well as gasoline, and that hot water on a manifold or carbureter will enable car to be started. But for temperatures above 35 deg. a mixture of five parts 37-test kerosene and one part high-test gasoline, 70 or higher if you can get it, will give astonishingly good results on both power and speed. I would rather have it for a trip than straight gasoline of any test. The kerosene has more power, gives a quicker explosion and is much hotter while the small percentage of high test gasoline, like ether, rolls up the kerosene as the rush of air through the carbureter scoops them both up and on into the cylinders.

Until we can get a device that will either heat clear kerosene and hold it at a uniform temperature so that it will evaporate like high-grade gasoline—or better still, a device which will atomize it into the combustion chamber at the proper moment, it will not be found very satisfactory except where high speed can be maintained.—F. A. Parker.

### Elgin Engine Test

Farnhamville, Ia.—Editor MOTOR AGE—Is the Falls engine used in the 1917 Elgin six a high-speed engine?

2—At what speed does it reach the height of its power curve; also what power does it show at this speed?—Charles Mahe.

1—It is considered to be a high-speed engine.

2—It has a bore of 3 in. and a stroke of 4¼ in., and a dynamometer reading taken some months ago indicates that the engine develops 35 hp. at a speed of 2500 r.p.m.

### To Get Grease Off of Paint

Evansville, Ind.—Editor MOTOR AGE—In revarnishing my car, how can I remove the grease accumulated on the gearbox and differential housing without injuring the paint?

2—Can a cylinder be lined with aluminum so that when an aluminum piston is used you can overcome the difficulty caused by using a soft-metal piston against a cast-iron cylinder.—A Reader.

1—By the use of a varnish cleaner. There are a great many to be found on the market. A steam jet will also remove the grease without harming the paint.

2—No. There is no difficulty coming from using aluminum against cast iron as far as bearing effect is concerned. The

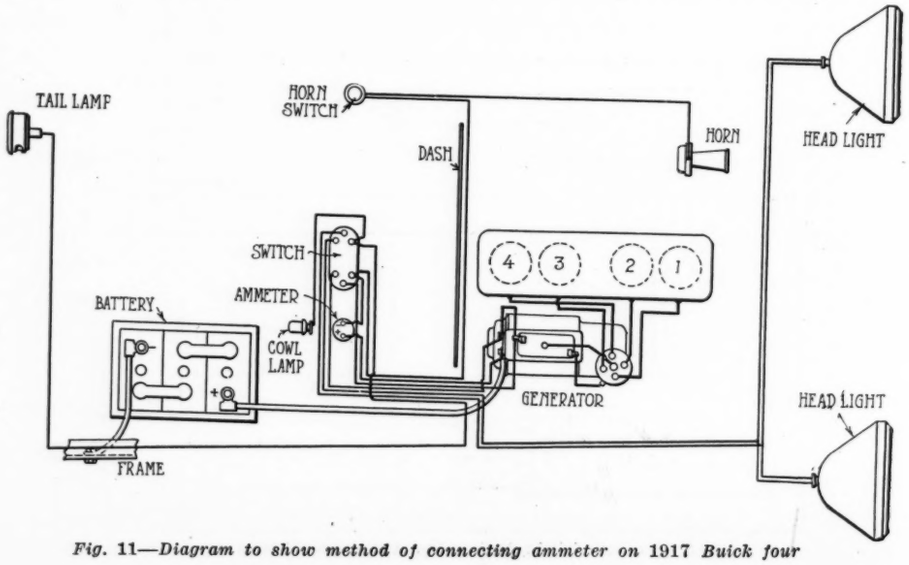



*Fig. 11—Diagram to show method of connecting ammeter on 1917 Buick four*

only real difficulty found in the use of the two metals in this manner is that the coefficient of expansion of the two is different. Aluminum expands more than cast iron with the same amount of heat. The result is that the aluminum pistons must be given greater clearance than would be necessary with cast-iron pistons. A lining of aluminum in the cylinder would not remedy this trouble and, furthermore, aluminum against cast iron is a better bearing medium than aluminum against aluminum.

### Charging Rate in Cadillac

Milwaukee, Wis.—Editor MOTOR AGE—At what rate is the generator in a 1914 Cadillac supposed to charge, running at a speed of about 18 m.p.h.?—A. O. Ohrmund.

The charging rate depends upon the condition of the battery. If the battery is low the charging rate may be from 25 to 30 amp. If the battery is nearly fully charged the charging rate may not be over, say 5 amp. You will thus see that the charging rate does not depend upon the speed of the car but rather upon the condition of the battery.

### Connecting Two-Wire Horn

Berwick, N. D.—Editor MOTOR AGE—My 1917 Grant six has only one wire for the present horn, and I would like to know how I can connect a horn requiring two wires.—H. W. Arnold.

Connect one terminal of the two-wire horn to the wire leading from the battery and connect the other terminal by a short wire either to some metallic part of the body or to the frame, just so there is a ground return through the frame to the battery. If the horn does not blow, reverse the wiring on the horn.

### Date Ford Engine Was Made

Corinth, N. Y.—Editor MOTOR AGE—On a Model T. Ford engine No. 77,117 what is year of manufacture?
2—I am converting the Ford into a truck. What percent of power will be lost by the magnets if left as when new?
3—I have an Atwater Kent system, so that the magneto simply furnishes lights which I will seldom need. Would you advise replacing the old carburetor with kerosene type?
I have used an Air Friction on a large car for several years using a mixture of 1 gas to 3 kerosene with good results.—C. L. Scott.

1—Engine No. 77,117 was manufactured under date of Oct. 6, 1911.

2—The power loss caused by the magnets of the Ford magneto has never been computed as far as we know.

3—For trucking purposes a kerosene system should be satisfactory. Before buying the kerosene burner, however, make sure by demonstration or other proof that it will handle this low-grade fuel efficiently.

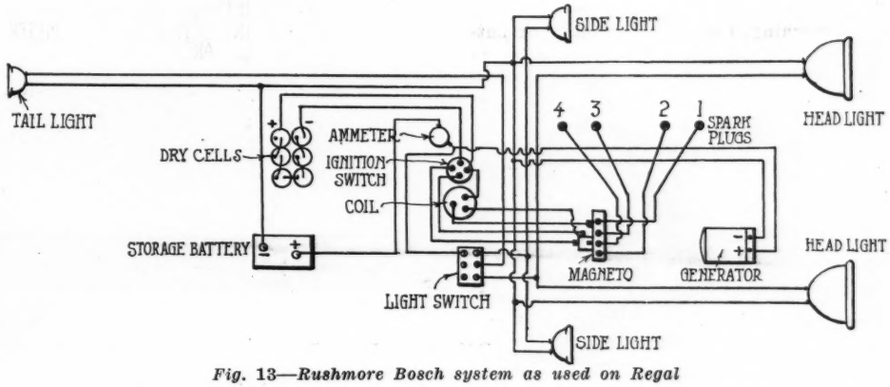



*Fig. 13—Rushmore Bosch system as used on Regal*

### Hudson's Average Speeds

Champaign, Ill.—Editor MOTOR AGE—Advise average speeds made by the Hudson super six in the speedway races of last season.
2—How many six-cylinder cars will be in the 1917 racing lineup?
3—How do the number of sixteen-valve four-cylinder engines used compare with all other types of racing engines.
4—Is the Packard Co. going to bring out a racing team this season?—R. E. Lindsey.

1—The highest speed obtained was 104 m.p.h. and the general average was 93 m.p.h.

2—Due to the fact that so many of the large races have been called off because of the war, it is rather a quandary what cars will be seen this year.

3—The Stutz and Duesenberg racers were the only ones campaigned extensively which used sixteen-valve engines.

4—No.

### Hudson Power at Various Speeds

Kansas City, Mo.—Editor MOTOR AGE—What is the horsepower developed by the Hudson Super-Six engine at 500, 1200, 1400, 1500, 1800 and 1900 r.p.m.
2—Can you remove the pistons and connection rods by dropping the crank case on this engine?—J. W. Clower.

1—The horsepower developed by the Hudson Super-six engine at 500 r.p.m. is 15; 1200 r.p.m., 42; 1400 r.p.m., 50; 1500 r.p.m., 55; 1800 r.p.m., 65; 1900 r.p.m., 68.

2—Regarding the removal of pistons and connecting rods without taking the head off, only Nos. 3 and 4 can be removed this way.

### Disbrow Specifications

Seattle, Wash.—Editor MOTOR AGE—What is the bore and stroke of the Disbrow semi-racing cars?
2—The piston displacement?
3—What is the brake hp. of this engine?
4—What is the speed?
5—What is the gear ratio?—Bob Masumoto.

1—Model A, 5.1 by 5.5; model B, 5.25 by 7; model C, 3.75 by 5.5.

2—Model A, 449 cu. in., model B, 567 cu. in., model C, 243.

3—There are no brake horsepower figures available.

4—According to the makers the speeds of the three models are as follows: Model A, 87 m.p.h.; model B, 95 m.p.h.; model C, 90 m.p.h.

5—2¾ to 1.

### Highest Hudson Speed

Alton, Ill.—Editor MOTOR AGE—What is the highest speed any Hudson has attained?—Claron Meldrum.

The highest officially recorded speed of a stock Super-Six car is 102.5 m.p.h., or covering a distance of one mile in 35.11 seconds. This car was driven by Ralph K. Mulford on April 10, 1916, under the direction of the A.A.A.

### Ammeter on 1917 Buick

Newman, Ill.—Editor MOTOR AGE—Illustrate method of connecting an ammeter on a 1917 Buick Four.—A Reader.

A wiring diagram of the 1917 Buick four showing method of connecting an ammeter is shown in Fig. 11.

### 1917 Chandler Wiring

Tupelo, Miss.—Editor MOTOR AGE—Give a diagram showing how an ammeter may be installed on a Chandler, 1917 model. Also, what is the best kind to use on this car?—H. C. McNutt.

A diagram showing the proper method of connecting an ammeter to this car is shown in Fig. 10. Any two-terminal ammeter is suitable for use on this model.

### Overland Daily Output

Lennys, Mont.—Editor MOTOR AGE—What is the daily output of the Overland?
2—Publish wiring diagram of Auto-Lite system used on 1915 Model K. Abbot Detroit.—Almon Berg.

1—The total 1916 output was 142,771 cars or an approximate average of 480 per day, figuring 300 working days.

2—Shown in Fig. 12.

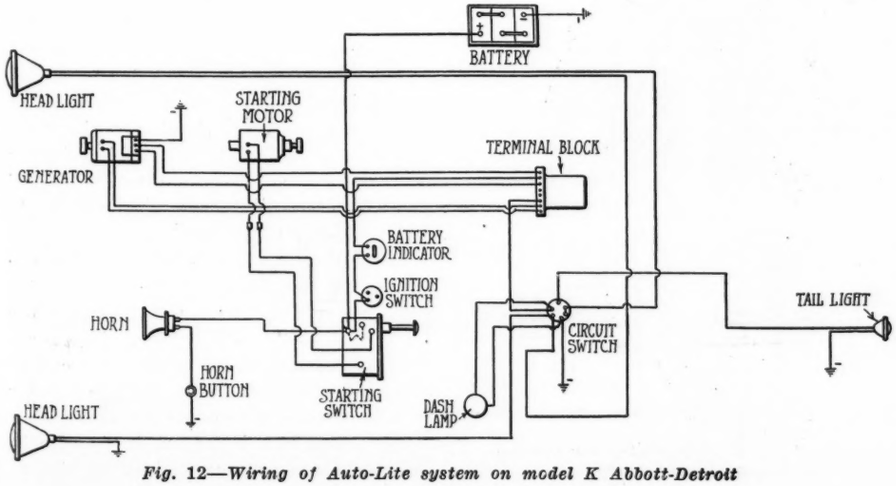
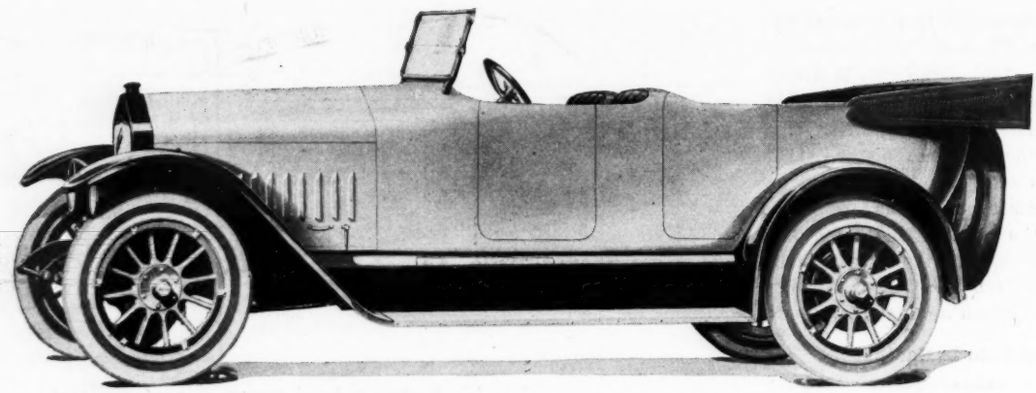



*Fig. 12—Wiring of Auto-Lite system on model K Abbott-Detroit*



*The seven-passenger is one of three principal body styles of the new National Highway twelve. The others are a four-passenger sport-type phaeton and a four-passenger roadster with cloverleaf seating*

# New Features in Latest National

## Intake System Allows Twelve to Handle Low-Grade Fuel Satisfactorily

A NEW intake system designed to allow the engine to handle very heavy grades of gasoline with satisfaction is among the many new features found in the latest National twelve-cylinder car. The principal features of the car are still in evidence, but there are a number of little niceties that are of especial interest.

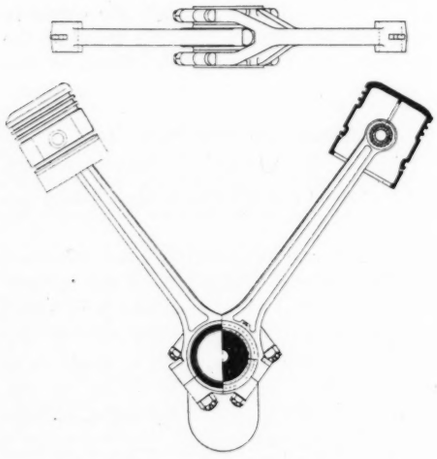
For instance the bore is increased from 2¾ to 2⅞. There is a counterweighted crankshaft with larger bearings and a detachable cylinder head. The oiling system is also much improved.

Reverting to the new intake system, which is the culmination of an effort on the part of the National engineers to devise means of handling low-grade fuel satisfactorily. This intake is divided into three parts. The manifold which connects the two blocks of cylinders is water jacketed, forming the water outlet from the cylinders. Its temperature is naturally a fairly constant quantity, inasmuch as there is a thermostat located in the pipe leading to the radiator. Next come the two-cored passages within the cylinders, these consisting of a cross passage leading from the inside to the outside of each block and a longitudinal passage from end to end of each block.

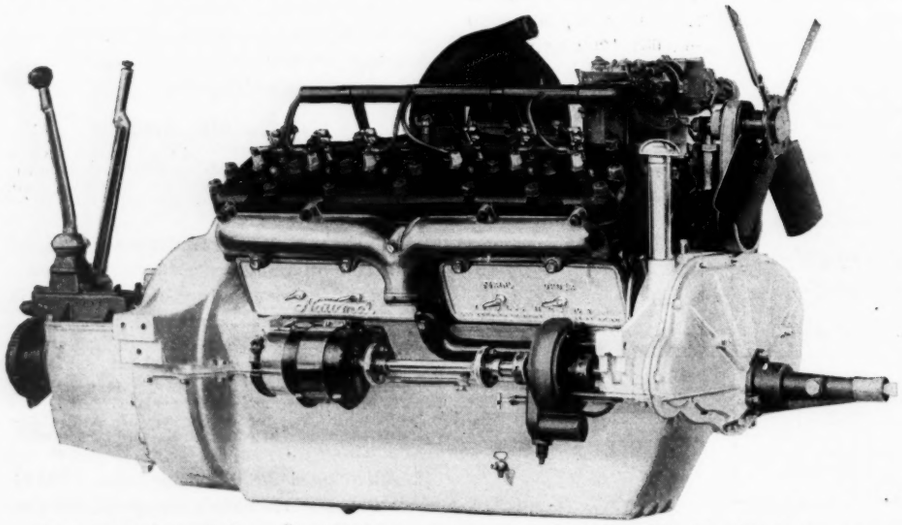
There is a hot spot which has been applied at the point where the cross passage intersects the one which runs lengthways. At this hot spot the exhaust outlets are not separated from the intake manifold by a water space. This serves to maintain a good temperature throughout the passage. At the center, where the cross passage joins, a special exhaust pocket is cast beneath the intake as well as above it. It is at the point where the direction of flow of the gas changes that condensation is most likely to occur, and so this spot is kept hot enough to vaporize anything thrown down there.

Not the least important of the changes is the use of the detachable head, because the even size of combustion chamber which this makes possible is of conspicuous advantage in obtaining perfectly regular running at idling speeds, where variations in the force of each explosion are most easily observed. This change in head design has not affected the layout of the engine in any way. The valves are still arranged L fashion and on the outside of the V, leaving the alley clear for the accommodation of the starting motor, the carbureter and the ignition unit. There are gear drives for the two camshafts and a silent chain for the ignition unit. The latter is new to the National, being now a double-header Delco outfit; it is mounted at the front end of the cylinder alley and the shaft which operates it carries the fan pulley, this bringing the belt high up where it is well protected from dirt and oil and therefore likely to have a maximum durability.

In the new crankshaft only four balance masses are employed. Experiments with both four and six masses showed that the four were more satisfactory. There are two at the center and one at each end of the shaft, the shaft being, for the purpose of balancing, considered as two three-throw cranks, each half being put in balance by its own pair of counterweights. In obtain-



*Forked connecting rod and piston assembly of the twelve*



*The new twelve-cylinder engine develops a maximum speed close to 70 with full size touring body. The head design is different, but the layout is unaffected*

ing the masses the rotating portions of the connecting rod assemblies were considered as well as the crank pins.

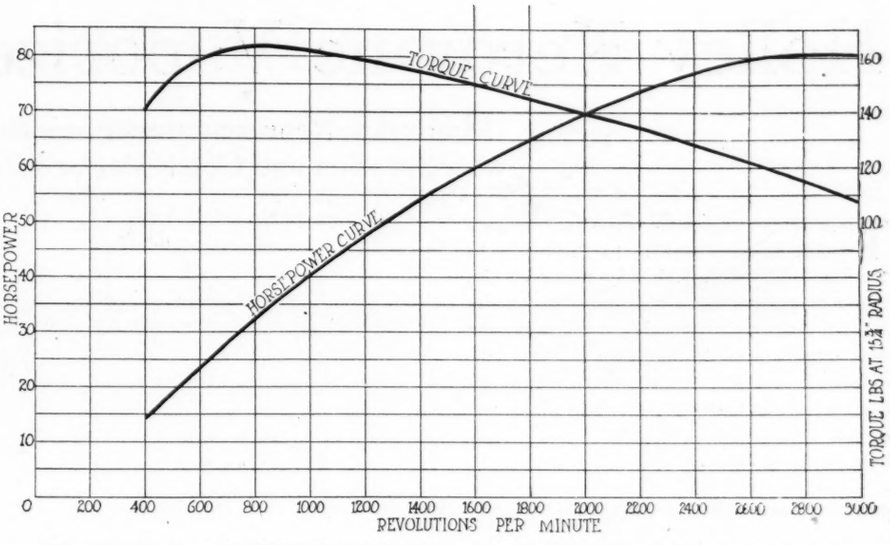
Throughout the crankshaft there is an oil passage from end to end, and oil is fed to each of the three main bearings. Should the feed to either two of these cease by any improbable accident, the remaining one is thus able to supply all the bearings, while with all three feeds in normal condition, a more than ample supply is insured to every part. Pressure is controlled by the usual variety of release valve. There is also an additional adjustable release valve for the separate oil lead that goes to the front end for lubricating the gears and the chain. There are also individual leads to the camshaft bearings.

In laying out the new engine a good many experiments were made with valve timing and a very moderate setting finally adopted. The exhaust opens at 43½ deg. before bottom center and closes at just under 3 deg. past top center, while the intake opens 6 deg. past top and closes 42 deg. past bottom center. The lift is rapid, being from a mushroom tappet and the power peak is around 3000 r.p.m. At 800 r.p.m. the hp. is 32; 14 hp. is obtained at 400 r.p.m. and the curve runs smoothly to the maximum of 81 hp. at around 2900 r.p.m. This means that the car has a wide speed range with especially favorable power to weight conditions from around 10 to 30 m.p.h. where the accelerative abilities are most noticeable. A maximum speed is not yet settled definitely but it is nearer to 70 than to 60 m.p.h. with a full size touring body and may perhaps prove to be higher than 70. The standard gear ratio on high is $4\frac{7}{12}$ to 1.

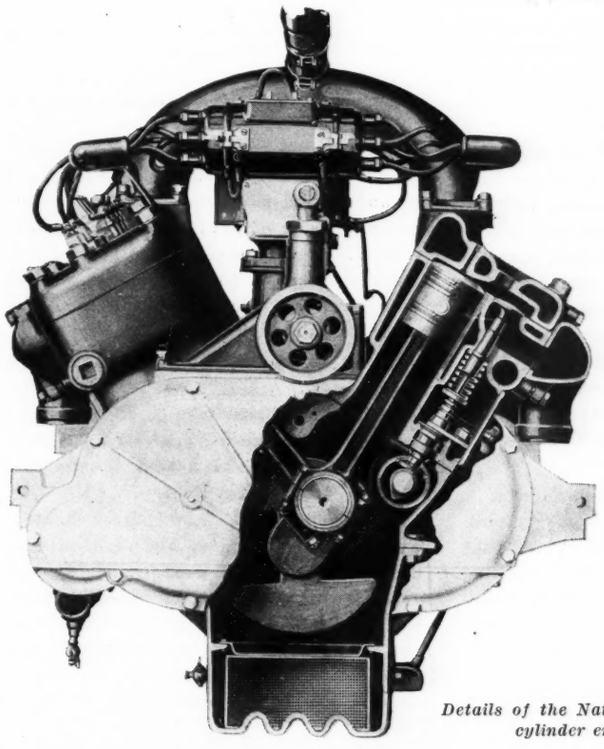
With the counterweighted crank the need for excessively light reciprocating parts is not pronounced, so cast iron is used for the pistons. The connecting rod assembly comprises a forked and a plain rod, the cylinders thus being directly opposite each other and not staggered. Piston pins are tight in the pistons which have four rings, three above and one below the pin.

For cooling the water pump is divided into two sections, though there is only one

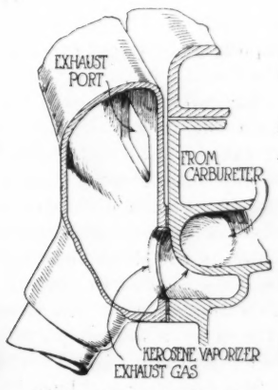
**(Concluded on page 47)**



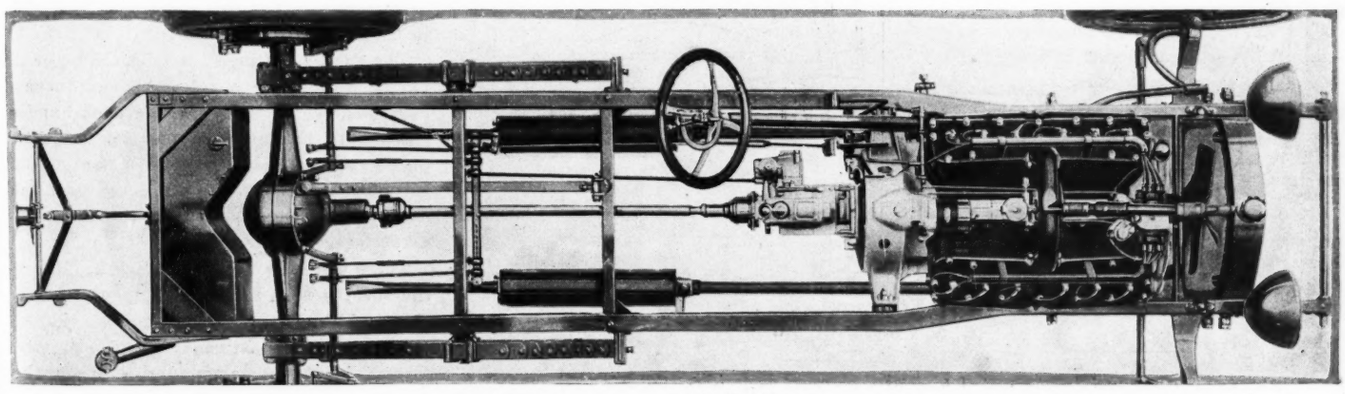

*The curve chart of the National twelve shows a wide speed range. The maximum speed is not settled definitely*



*Details of the National twelve-cylinder engine*




*The point where the direction of gas flow changes is kept hot enough to vaporize anything thrown there*



*Chassis of National Highway twelve. Note the long, flat, cantilever springs and the accessibility of the parts*

# Holley Kerosene Vaporizer for Fords

## Motor Age Representative Finds Rapid Acceleration and Good Power in Test

THE Holley kerosene vaporizer is now ready for application to Ford cars in the United States. Already many of the vaporizers have been shipped abroad. A MOTOR AGE representative was given the first opportunity to examine the new instrument and witness its performance on the test block and installed on a Ford car. It will burn kerosene satisfactorily. Gasoline is used as a starting medium only. A dynamometer test of maximum horsepower showed about a 20 per cent falling off over the performance of gasoline, although this is hardly noticeable commercially. It was demonstrated to the MOTOR AGE representative that a Ford car equipped with the vaporizer will idle smoothly at 6 m.p.h. and then accelerate rapidly and without chocking upon opening the throttle wide.

Difficulties in kerosene vaporization have been due to the sluggishness of the fuel. It takes considerable more heat to gasify or vaporize kerosene than it does gasoline. Because of the difference in the burning speed of kerosene and gasoline, the former, which is the slower burning fuel, requires less compression to operate satisfactorily. This reduction in compression is accomplished by a low-compression head substituted for the present Ford head.

The vaporizer will burn kerosene, benzol, distillate, gasoline or any hydrocarbon with a final boiling point below 300 deg. The price is $22, complete.

Referring to the illustration in Fig. 1, showing a section of the instrument, kerosene and gasoline enter separate float chambers through conventional float-valve mechanisms. The shifter valve B determines which fuel shall be used. Which ever ing needle valve W and through a jet at J.

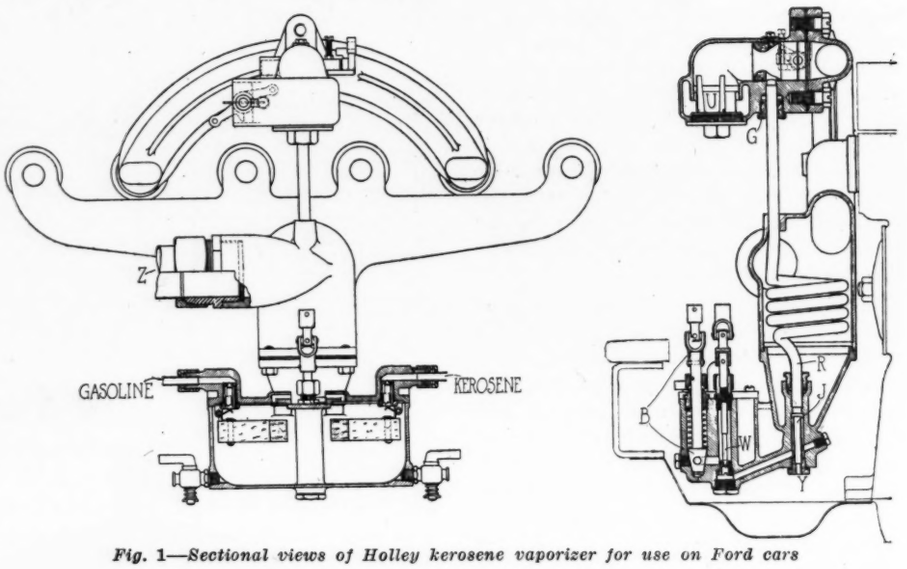



*Fig. 1—Sectional views of Holley kerosene vaporizer for use on Ford cars*

fuel it may be passes through the adjust- At the top of this jet the fuel is atomized by an air blast which is caused by the suction of the engine. This air enters at point Y. A very small quantity of air is admitted relative to the amount needed for a perfect explosive mixture, and the result is a very rich mixture.

This rich mixture is carried upward through a vaporizing tube R, which is located in the exhaust manifold. This tube is coiled to absorb all possible heat from the exhaust. It is said that the temperature reaches 500 deg. Fahr.

The rich mixture, now highly heated, passes from this coil to the main mixing chamber through the stuffing box G and here additional air is introduced through the air valve U, giving a proper combustible mixture. The suction of the engine governs the opening of the air valve in the mixing chamber and of course when the throttle is opened wider more air is introduced to mix with a higher charge of gas.

As previously stated the compression is reduced by the substitution of a new cylinder head. Actually it is reduced from about 60 lb. per square inch to about 48 lb. per square inch.

In attaching to a standard model T Ford with left-hand drive, the standard gaskets, collars and clamps are retained. The regular exhaust pipe is replaced by a longer one with special bends to attach it to connecter Z, using a standard Ford clamp nut for this purpose. The cylinder head is replaced with the new head by means of special long cap screws. The standard gasoline tank makes way for a two-compartment tank to carry the main supply of kerosene and a small amount of gasoline for starting.

There is a dash plate with control rods which is of course special installation. The arrangement of all this equipment is shown in the illustrations.

The engine is started as it would be ordinarily were there a regular gasoline carbureter fitted, with the shifter cock handle pointed to the gasoline position and the primer wire pulled out. After the engine has been run from 1 to 3 min. on gasoline the shifter-cock handle is turned to the kerosene position.

There are only two adjustments. One is the throttle-stop set screw for gaining the proper idling speed and the other is the needle-valve adjustment which is performed in the same manner it is on the gasoline carbureter.

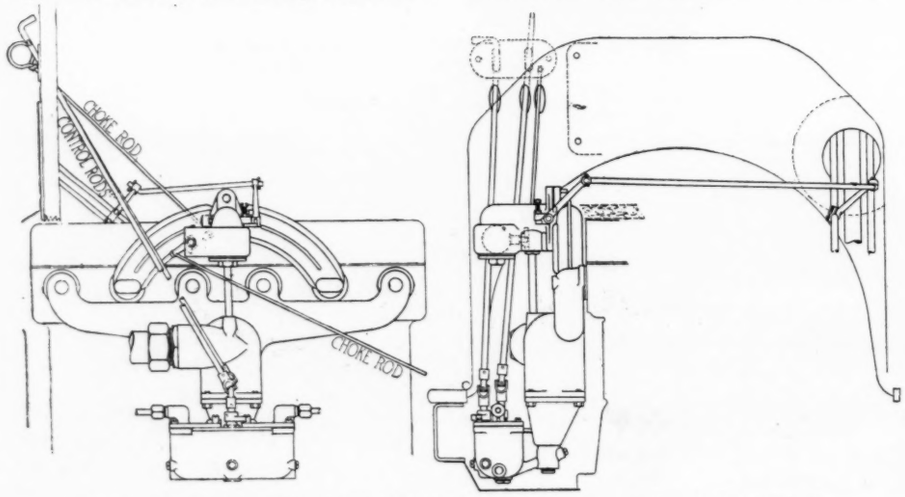
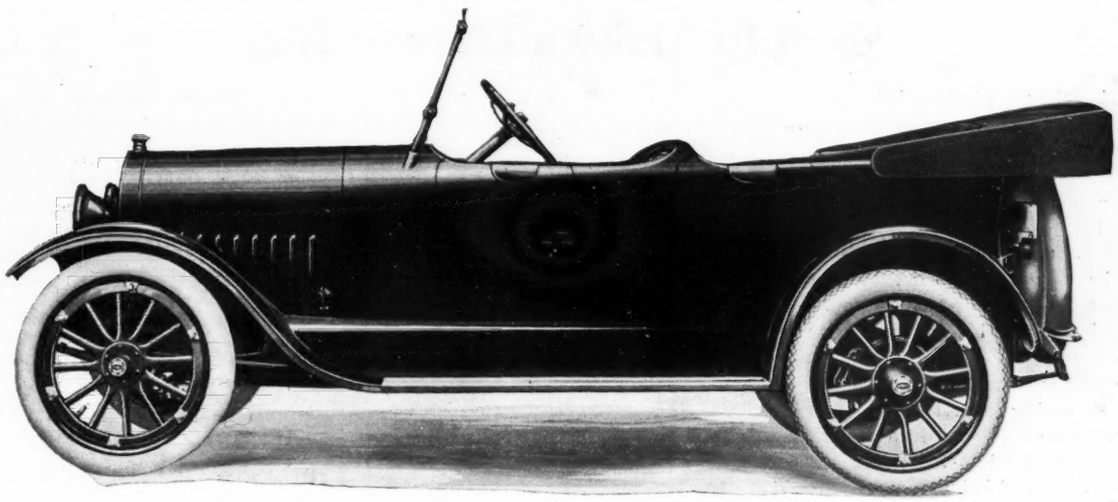



*Fig. 2—Showing installation layout of Holley kerosene vaporizer. Control rods for use of either gasoline or kerosene are conveniently located*

# Modern Mould in Empire 50 Body

## Mechanical Refinements Also in New Four at Increased Price



*The new Empire four-cylinder car has a higher, narrower radiator with new hood and cowl lines, modernizing it greatly over its predecessor*

A new four-cylinder, five-passenger car, designated as the model 50, is announced by the Empire Automobile Co., Indianapolis, Ind. The prime features claimed for the new offering are great power performance and easy riding qualities. It supplants the model 45 and because of its improvements both in the appearance of the body and in refinements of the chassis, together with the marked advance in the material market, a price increase is considered justified, the new figure being $1125 instead of $960, the price of the four-cylinder model 45.

The radiator is higher and narrower than that of its predecessor, presenting an increased cooling surface. The hood lines are higher and wider and the front cowl is raised, giving the car a smarter appearance. The windshield is now tilted, and the instrument board is of solid walnut. There are hand pads on all four doors. The center cowl is a refined and beautified modification of its predecessor. There is a double-texture Neverleak cloth one-man top instead of the single-texture top used on the model 45.

In the chassis is found the Borg & Beck dry-disk clutch which replaces the cone clutch formerly used. The new rear axle is of a different make, being semi-floating with a heavy yoke on the third member.

The Teeter-Hartley engine is continued with minor modifications. This is of T-head design as previously with a bore and stroke of 3⅞ by 5. It is said to deliver 40 hp. at 2000 r.p.m. The cylinders are block-cast. Pistons are made from gray iron. The lubrication system is the Tester patented splash type.

Ignition is furnished through a distributer from battery current and the switch is fitted with a key lock and the flow of current is automatically cut off when the engine is stopped.

A Stromberg carbureter is fastened to the cylinder block by means of a short spacer, the manifold chamber being within the cylinder block.

Option of two body finishes are offered on this touring car, a deep brown with brown Spanish leather upholstery and brown hood to match, or dark green with black long-grain leather upholstery. All fenders and running board splashers are black enameled.

*Chassis of the Empire 50. The engine is refined, and the clutch and rear axle are entirely new*

## National Highway Twelve

(Continued from page 45)

water intake and only one impeller. The pump casing is divided by a web running all around its circumference, and from each side of the case there is an outlet. The two outlets are brought together at a single flange, each here being of semi-circular section, and a divided pipe carries the water to the middle of the right cylinder block. Here one-half discharges direct to that cylinder set, and the other passes through a passage in the cylinder foot, then through a short cross pipe to the other cylinder block.

The chassis in which the new engine is fitted is identical with that of the previous model of Highway Twelve the outstanding feature, perhaps, being the long and flat cantilever springs which National has now been using for nearly four years. There are three principal body styles, a seven-passenger touring car, a four-passenger sport type phaeton and a four-passenger roadster with clover-leaf seating. The latter is proving a popular model and will constitute about two-fifths of the 1917 output. The four passenger sport phaeton which was shown at the winter exhibitions has a single front seat with a very roomy cabinet back of it large enough to hold quite a considerable bulk of light luggage. The other two models, of course, have divided front seats, the roadster having only the front entrance doors. Two colors are optional, a rather delicate shade of pearl grey and a rich tint of blue and all three models sell for $2,250 with complete equipment. Tires are 34 by 4½ in. and provision is made for two spares at the rear end of the frame. Special types, and closed bodies are, of course, also obtainable.

# The Motor Car Repair Shop

## How to Make a Garage Jack

A GARAGE jack, quickly handled, easily made, to lift axles equipped with wheels of any standard size is shown in Fig. 2. It obviates stretching under the car to place a small jack; it saves time in that it lifts the tire in one stroke of the lever instead of a half-dozen or more; it is too big to be easily lost, and inasmuch as it is made almost entirely of heavy wood it is practically indestructable and free from the ravages of rust.

Oak is the proper wood to use in its construction. The lifting lever is made from oak 2 by 4 narrowed down into a smooth handle at one end and left to size at the other. On the large end is bolted a hook of flat bar steel as shown. This hook should be made of ¼ by 2-in. stock, and it will require a piece about 8 in. long. The end should be forged to the shape shown and two holes drilled through to accommodate ½-in. bolts. Using these holes as spacers the lever should be drilled through so that the hook will project enough over the end to take care of any size axle. Another bar of 1 by 2-in. steel as a support for the bolts on the other side of the lever will make a much stronger assembly.

**Directions for Making**

The standards can be made of 1 by 3-in. oak. These should be mounted on an oak plank about 8- by 15- by 1-in., with a brace bolted to the plank and the standards as shown.

The distance from the floor to the bolt which supports the lever should be 18 in., and, therefore, the height of the standards should be 19 in. which will give a 2-in. clearance from the bolt to the top of the standard. Observing these measurements, the hook will be about 16 in. from the floor when the lever is level with the ground.

Now comes the bracket which will serve to lock the jack and hold the wheel of the ground. This should be made of ½-in. round cold-rolled steel, bent in a U-shape as shown in the sketch. The free ends are bent and inserted through the standards in holes drilled for the purpose. It should be of such a length from the free ends to the bottom of the U that when wedged behind the first bolt head as shown it will hold the hook about 18 in. from the floor. Then to raise the jack higher the rod can be placed behind the end of the hook in a notch cut in the wood for the purpose, or to lower the hook, it can be wedged behind the farthest bolt.

### Fire! Where's the Extinguisher?

In garages and factories where gasoline is much used and the fire risk is great and quick action in case of fire urgent, it is well to have some means of finding the fire extinguishers with the least possible amount of hunting around.

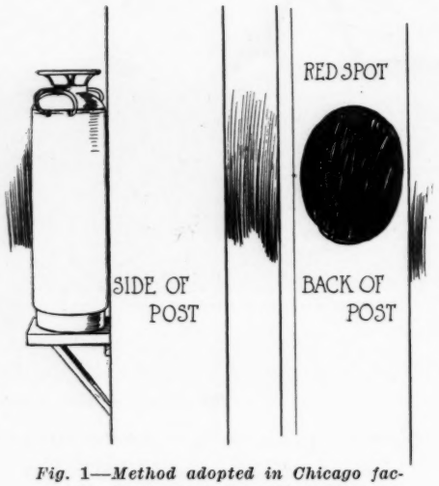



*Fig. 1—Method adopted in Chicago factory for locating fire extinguishers*

Shown in Fig. 1 is a method which has been adopted by a Chicago engine-manufacturing plant. Fire extinguishers are located at certain distances from each other throughout the plant on standards fastened to the sides of whitewashed posts.

As will be seen in the left-hand sketch in Fig. 1 the extinguisher is readily visible from the side of the post, and naturally is as easily seen from the front. But from the back it is quite obscure and if the fire happened to occur back of this post it would require frenzied searching and a loss of valuable time.

In the right-hand sketch is shown the way this manufacturing plant located its fire extinguishers from the back of the posts. A red spot about 8 in. in diameter is painted over the whitewashed surface directly opposite the fire extinguisher. In case of fire, if the nearest man sees no extinguisher he looks for the nearest red spot.

### Gasoline and Old Cars

If we were to sum up reasons for failures in performance of cars manufactured before two years ago from the descriptions of these failures that come in as inquiries to MOTOR AGE, it is safe to say that a good majority of the failures could be traced to one cause, imperfect carburetion.

The present grade of gasoline WILL NOT give perfect performance in old cars. If you have an old car which you yourself have driven for several years, you have noticed a power loss, unusually hard starting, coughing and spitting. If you have cared for your car well you are mystified at this trouble. Do not be mystified further. It is almost a safe wager that it is imperfect carburetion.

You have an old carbureter which was well designed to handle the highly volatile fuel of a few years ago. There are little or no provisions for heating the air or the gasoline, because a few years ago this was not as necessary. To make your engine operate properly you must install a thoroughly modern carbureter and make provisions for heating the air or the gasoline or both. With your old engine, with its long manifolds and more or less out of date construction, you have got to heat everything possible along the gasoline line to get good results, and do not be afraid of overheating the gas. Or you can pay more money for high-test gasoline. One or the other of these steps is imperative, if you want a good car again. It will save enough fuel to pay for the alterations.

**Why Gasoline Is Poor**

Here is why present-day gasoline is poor. Consider that you have a cup of thick syrup and a cup of water. Insert a straw in the cup of water. The lips can suck this readily through the straw. Insert the straw in the thick syrup. You will have difficulty in sucking the syrup through the straw. Now heat the syrup until it becomes thin. It can be readily sucked through the straw. This is an exaggerated example of the action of present day gasoline in comparison with the good fuel of a few years ago. It is sluggish and the air jet slips on it when you try to accelerate. If it is heated enough, like the syrup, it will be picked up by the air jet much more readily.

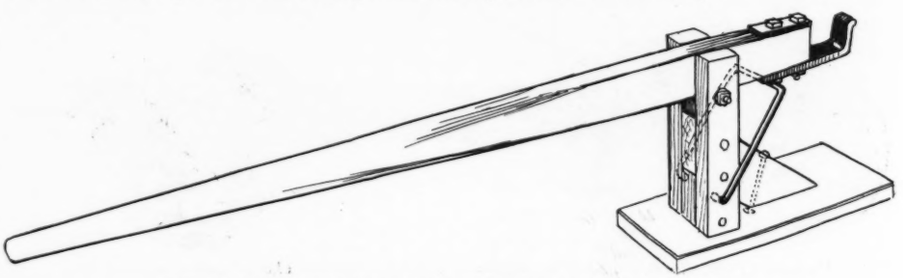
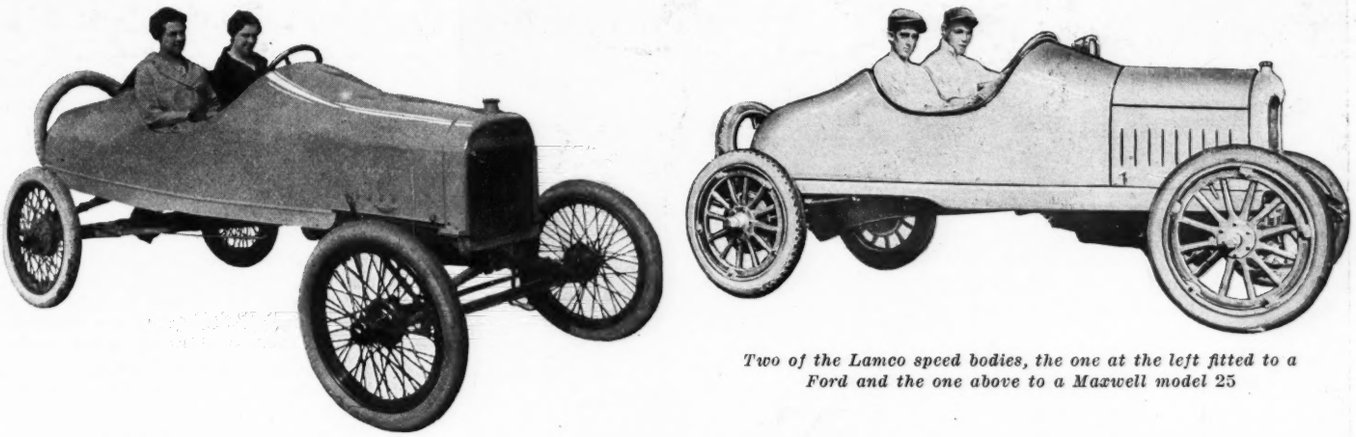


*Fig. 2—Home-made garage jack will handle cars of any weight*

# The Accessory Corner



*Two of the Lamco speed bodies, the one at the left fitted to a Ford and the one above to a Maxwell model 25*

**Lamco Speed Bodies**

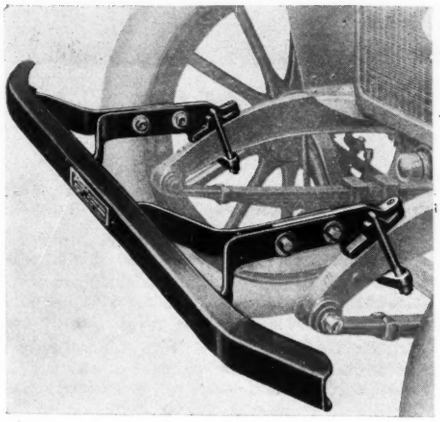
THE Lehman Mfg. Co., Cannelton, Ind., makes Lamco speed bodies to fit the Maxwell or Ford chassis. They are shipped complete, ready to bolt on, and are finished in Stutz blue or white, Mercer yellow or any other color to special order. They are of the semi-racing speed type. Price, $130.

**Ball Thrust Axle Bearings**

The Bailey Ball Thrust Bearing is designed to replace the thrust washers at the left, gear, side of the Ford and Chevrolet 490 differential. It is the invention of George D. Bailey of Chicago, and the distributor is Ahlberg Bearing Co., Chicago.

**New Stewart Autoguard**

The Stewart Autoguard has only five prime parts, the channel bar, two springs and two heads, or frame connections. It is made of very high carbon steel, heat-treated. The shock-absorbing members consist of full elliptic springs, also made of high carbon steel. The construction permits adjustment of the springs to fit various widths of frames without making it necessary to drill holes in the channel. The frame brackets, or attaching members, are universal and fit practically any make of car. Provision is made for adjusting the distance between the Autoguard and the wheel. The device is finished in black enamel. Price, $9; west of the Rockies, $9.75. Special model for Ford cars, $7.50; west of the Rockies, $8.25. The Stewart-Warner Speedometer Corp., Chicago.



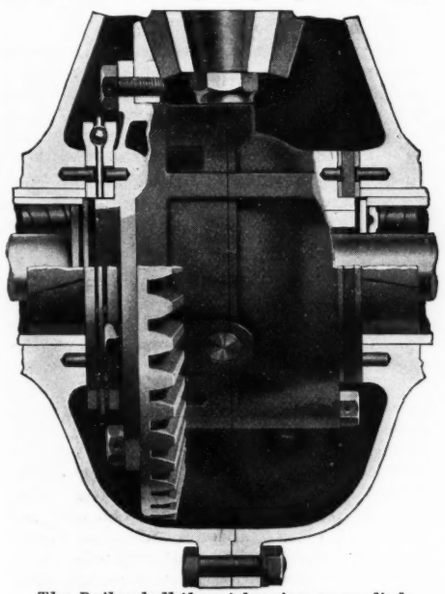
*The new Autogard, a Stewart-Warner product*

**Never-Skid for Dual Tires**

The Never-Skid device has crosspieces that are built of woven steel wire of the best quality, making them unbreakable except through wear and giving a fine gripping surface for ice and snow, it is claimed. Turnbuckles in each chain allow for adjustment. It is designed for motor trucks and can be applied without jacking up the truck. A special tool is supplied with each set, which consists of two chains, to insure quick attachment. The Never-Skid is made to fit according to the make of tire, the size, center to center measurements in inches and style, standard or demountable. Never-Skid Mfg. Co., New York.

**Cantilever Shock Absorbers**

Climax shock absorbers are built on the principle of compound cantilever action. They are made to fit any make of car that has full or three-quarter scroll elliptic rear springs. Minor actions of the axle are transmitted to the cantilever bars and absorbed by the tension springs of the shock absorbers. All parts are treated specially to withstand wear, and a special quality of steel is used. The finish is of superior black ebony, baked enamel, with nickel bolts. Price, $25 a pair. Climax Shock Absorber Co., Benton Harbor, Mich.



*The Bailey ball-thrust bearing as applied to the Ford differential*

*Never-Skid device for dual tires*

*Shock absorbers that are built on cantilever principles.*

# From the Four Winds

HUDSON WINS IN ANNUAL FIESTA PARADE—A Hudson enterd by the Crockett Automobile Co. took first prize in the electric division of the night motor car parade in the San Antonio, Tex., annual fiesta

**NINE Miles of Brick Road**—The Noble County, Indiana, board of county commissioners has awarded contracts for the construction of 9 miles of brick roads in the county. The highways will be 16 ft. wide, of brick and will cost $120,450.

**Louisville Club Elects**—The following officers have been elected by the Louisville Automobile Club: President, Dr. R. R. Elmore; vice-president, Thomas Trammell; treasurer, Frank I. Dugan. Three hundred and nine new members have been enrolled during the year, bringing the total to 970.

**El Paso-Fort Worth Highway Progressing**—The counties between El Paso and Fort Worth, Tex., through which the El Paso-Fort Worth highway is to pass, are considering bonds for construction of the road. A few of the counties have voted bonds already. The highway will be more than 600 miles long.

**Chauffeurs Form Association**—The Chauffeurs' Club has opened clubrooms in Chicago. The organization is limited to drivers of privately owned cars, and the officers are to co-operate with the dealers and maintain a reference employment bureau where owners can get the services of experienced drivers. The club now has more than 350 members.

**Club to Aid Traffic Policemen**—The Rockford, Ill., Motor Club has appointed a traffic committee to help the police department in prosecuting infractions of the traffic laws. Reports will be filed of all cases of careless driving and parking, excessive speed, etc. It is believed that the services of this committee will have a tendency to minimize accidents and promote the safety of the public.

**How's This for a Record?**—George C. Jones of Wenatchee, Wash., drove into South Bend the other day in his Studebaker with three tires containing New Orleans air, the left front tire having covered more than 10,000 miles, and an average of 16 miles to the gallon of gasoline. To start with, the car had registered 8000 miles before the trip. It had come from San Francisco through San Diego, Yuma, Ariz.; Phoenix, El Paso, San Antonio, Houston, New Orleans, Montgomery, Atlanta, Richmond, Washington, D. C., and New York through Rochester and Cleveland to South Bend.

**How Pennsylvania Receipts Have Increased**—The receipts of the Pennsylvania highway department from motor car licenses were $2,147,742 April 1, an increase of $700,000 over last year. The entire fund is available now.

**Biddle Designer Navy Instructor**—Charles Fry, Philadelphia, Pa., designer of the Biddle motor car, made in this city, has received permission from the Navy Department to enlist in the Naval Reserve as motor car instructor. As Mr. Fry has only one arm, this is the first time a man has been allowed to enlist with a physical disability of this character.

**Cuts Railway Revenue**—The Southern Pacific railroad states in its annual report that motor car travel reduced the company's earnings in 1916 more than $1,000,000.

**Lakes Open Way to Cars**—Seventy-five motor cars were brought to Chicago from Grand Haven, Mich., recently. They were Reos and among the first shipments made with the opening of the season.

**Offers Hudsons to Red Cross**—The Bemb-Robinson Co., Hudson dealer, Detroit, has tendered its fleet of service patrols to the Red Cross for daily use during the campaign week and for duty at any time in the future.

**Dodge Bros. Give Banners**—Horace E. and John F. Dodge of Dodge Bros., have presented the army recruiting station at Detroit with large banners demanding enlistment in the army.

**Missouri's Tax Is Doubled**—Governor Gardner has signed two bills passed by the recent legislature which double the state tax on motor cars and give precedence of a chattel mortgage over a mechanic's lien.

**Delaware Sets Bridge Speed**—A new act passed by the last Delaware legislature requires police officers and bridge guards to hold motorists to 6 m.p.h. in crossing bridges and to arrest persons who fail to observe the law in that particular.

**$2,000,000 Revenue in California**—The California motor vehicle department already has received $2,282,217.27 for registrations for 1917. There have been 217,245 registrations of motor cars, 10,397 of chauffeurs and 1863 of dealers.

**Cincinnati Club Elects**—The Cincinnati Motor Club has elected new officers for the coming year as follows: Milron D. Campbell, president; William Leiman, vice-president; Robert C. Crowthers, secretary, and Melville T. Williams, treasurer.

**Northwest Wants Motor Tourists**—Washington and Oregon have each voted $45,000 and British Columbia $25,000 which will be expended for publicity to bring motorists from all parts of the United States to the Pacific Northwest this summer.

**Cement and Stone to Unite County**—Cass County, Michigan, has voted in favor of a $600,000 bond issue for a road system. When the proposed highways are completed no farmhouse in the county will be more than 1½ miles from a cement or stone road.

**Nash Plows Acres of Gardens**—The Nash Motors Co., Kenosha, Wis., will plow and harrow ground belonging to the company, and as much more as is necessary to fill applications, and divide it into garden plots, which will be apportioned free to each employe who will agree to plant and care for a garden this summer. Five hundred applications were received soon after the announcement of the plan.

**Virginia Automobile Club Revives**—Representatives of various motor clubs of Virginia met at Norfolk recently and revived the Virginia Automobile Club, which has been inactive for more than a year. The officers elected are: John H. Lesner, Norfolk, president; W. Reginald Walker, Richmond, secretary; Ashby Reardon, Richmond, treasurer; Goldsborough Serpell, Norfolk, E. C. Pelouse, Richmond, and C. C. Lamond, Alexandria, vice-presidents. The revived association starts with a membership exceeding 3000.

## Coming Motor Events

**CONTESTS**
**—1917—**

| | | |
|---|---|---|
| May | 10 | Uniontown, Pa., speedway. |
| May | 19 | New York, speedway. |
| May | 30 | Walla Walla, Wash., track. |
| May | 30 | Uniontown, Pa., speedway. |
| May | 30 | Cincinnati, Ohio, speedway. |
| June | 16 | Chicago, speedway. |
| June | 23 | Cincinnati, Ohio, speedway. |
| July | 4 | Visalia, Cal., road race. |
| July | 4 | Spokane, Wash., track. |
| July | 4 | Benton Harbor, Mich., track. |
| July | 4 | Uniontown, Pa., speedway. |
| July | 4 | Tacoma, Wash., speedway. |
| *July | 4 | Omaha, Neb., speedway. |
| July | 15 | Missoula, Mont., track. |
| July | 17-19 | Intercity Reliability. |
| July | 22 | Anaconda, Mont., track. |
| July | 29 | Great Falls, Mont., track. |
| Aug. | 5 | Billings, Mont., track. |
| *Sept. | 3 | Cincinnati, Ohio, speedway. |
| Sept. | 6 | Red Bank, N. J., track. |
| Sept. | 8 | Pike's Peak, Colo., hill climb. |
| *Sept. | 15 | Providence, R. I., speedway. |
| Sept. | 22 | Allentown, Pa., track. |
| Sept. | 28 | Trenton, N. J., track. |
| *Sept. | 29 | New York, speedway. |
| Sept. | 30 | Uniontown, Pa., speedway. |
| Oct. | 6 | Uniontown, Pa., speedway. |
| Oct. | 6 | Danbury, Conn., track. |
| *Oct. | 13 | Chicago, speedway. |
| Oct. | 13 | Richmond, Va., track. |
| Oct. | 27 | New York, speedway. |

* A. A. A. Championship Award Event.

# Among the Makers and Dealers

**MASON Increases Capital**—The Mason Tire & Rubber Co., Kent, Ohio, has increased its capital from $1,000,000 to $3,000,000.

**Assmus Leaves Maxwell Export**—C. O. Assmus, manager of the Maxwell export field sales department, has resigned.

**Radoye to Leave Hudson**—G. U. Radoye has resigned from the Hudson Motor Car Co., where he has been assistant director of sales and advertising.

**MacMullen to Leave Chalmers Branch**—B. J. MacMullen has resigned his position as manager of the Chalmers Motor Co. branch at Kansas City, Mo.

**Jenkins Increases Capital**—The Jenkins Vulcan Spring Co., St. Louis, Mo., manufacturer of the Vulcan motor car spring, has increased its capital from $50,000 to $150,000.

**Morgan Resigns from Abbott**—Guy Morgan, president of the Abbott corporation, has resigned. Mr. Morgan was formerly with the Mitchell Motors Co. of Racine, Wis., before joining the Abbott corporation.

**2000 Cars Behind**—The Hupp Motor Car Corp. is 2000 cars behind its orders. This is despite the fact that the Hupp company has enjoyed the largest business in its history during the first quarter of this year.

**Krebs Increases Capital**—The Krebs Commercial Car Co., Clyde, Ohio, has increased its capital stock from $100,000 to $500,000. New York capital has been interested, and the business will be increased. Officers of the company remain the same.

**Guaranty Securities Declares Dividend**—The Guaranty Securities Corp., engaged in financing motor car purchases by time payments, has declared a dividend of 2 per cent, payable to stock of record April 14. The capital stock is $1,000,000.

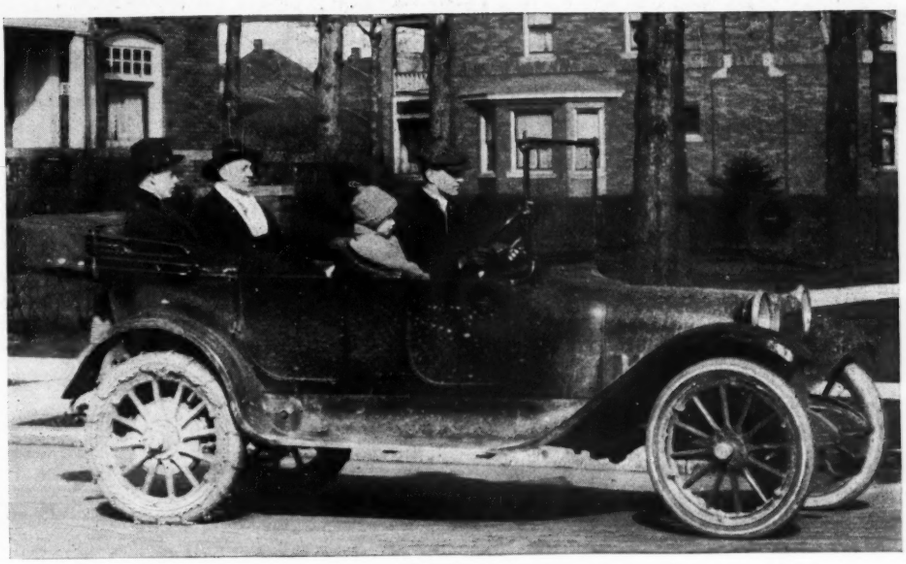
**Herbert to Make Tractors**—Clifford V. Herbert, son of Victor Herbert, the composer, will manufacture tractors and believes he will be turning out about eighty a month by July. Mr. Herbert has been gaining practical experience by working in the Ford Motor Co. plant.

**Oberlin Buys Ohio Plant**—The Oberlin Auto Truck Mfg. Co. has purchased the building formerly occupied by the Kyle Mfg. Co. at Lancaster, Ohio. The new concern will be capitalized at $1,200,000, of which $750,000 will be common and $500,000 preferred. About 250 men will be employed.

**Takes Ford Baltimore Branch**—E. T. Backus, first assistant to N. A. Hawkins, sales manager of the Ford Motor Co., has resigned to take over the Ford branch in Baltimore. Alexander McGill who has been in charge of the service school of the Ford company in Detroit, will be manager of the service department.

**Another Wisconsin Dealer Association**—Dealers and garage owners in Watertown, Wis., and the district, have organized the Inter-County Automobile Dealers' Association, which will affiliate with the Wisconsin Retail Automobile Dealers' Association. The officers are: President, Arthur Meyers; vice-president, Harley Whittemore; secretary, Hans Fast; treasurer, Al Frederick.

**Packard School Opens**—The Packard Motor Car Co.'s truck sales school opened for its April session with twenty truck salesmen in attendance. The school has been established for several months and now is considered successful. After a week of study at the factory the salesmen are given additional education by mail and by visits in their own territory. Every truck salesman in the Packard organization is being enrolled in the school.



**DODGE BROS. FIRST CAR STILL USED—"Old Betsey," who appears above, was the first Dodge Bros. car. She has a record of more than 150,000 miles and is in daily service in the experimental department now**

**Lozier Decreases Capital**—The Lozier Motor Co. has decreased its capital from $500,000 to $200,000.

**Jinnett Joins Staybestos Mfg. Co.**—Herbert H. Jinnett has joined the Staybestos Mfg. Co., Philadelphia, Pa., as credit manager.

**Stewart-Warner Declares Dividend**—The Stewart-Warner Speedometer Co., quarterly of 1½ per cent on common, payable May 15 to stock of April 30.

**Everett Joins Standard Woven Fabric**—Richard Everett has joined the sales force of the Standard Woven Fabric Co., Walpole, Mass. He was formerly sales manager of the Raybestos Co.

**McCann Leaves Simms Magneto**—John McCann has resigned his position as purchasing agent of the Simms Magneto Co., East Orange, N. J., to enter partnership with W. R. Keene under the name of W. R. Keene & Co., New York, to manufacture taps, dies, drills, etc.

**Bixler Gets Republic Promotion**—H. W. Bixler has been appointed manager of the foreign department of the Republic Rubber Co. of New York. He has been with the company for six years, entering its employ at the Youngstown, Ohio, factory as assistant sales manager.

**Prescott Piston Ring Expands**—The western sales of the Prescott piston ring have increased to such an extent that the Prescott Auto Parts Co., Webster, Mass., has established the Prescott Piston Ring Shop in Chicago. A complete stock will be kept at the Chicago branch.

**Clark Equipment Expands**—The Clark Equipment Co., Buchanan, Mich., is building a new wheel shop, which will increase the present wheel capacity about 50 per cent. Additional equipment is being added in the steel foundry also, and as soon as the new machinery is installed and the building is finished the concern will be able to turn out about 100 finished wheels a day.

**Dean Resigns Hudson Position**—T. E. Dean has resigned as district manager in the Southwest for the Hudson Motor Car Co.

**Remy Opens Denver Branch**—The Remy Electric Co., Detroit, has opened a new service branch in Denver, Colo.

**Truck Ready for Army Use**—The United Motor Truck Co. has set aside a 5-ton United truck for the exclusive use of transportation of Home Guards who may be called to service. This truck will be kept filled with gasoline and lubricating oil, and a man will be detailed as driver for both day and night.

**International Company Expands**—International Motor Car Co., Allentown, Pa., has awarded a contract for the erection of a one-story addition, 50 by 240 ft., to be used as an assembling plant. The construction of the two extensions, 50 by 54 ft. and 50 by 70 ft., has been completed. The first will be used for machine work.

**Haynes Buys Factory Site**—The Haynes Automobile Co., Indianapolis, Ind., has purchased 58.85 acres for a new plant. A site of 38 acres, purchased some time ago, has been abandoned for manufacturing purposes as it was believed more ground should be available for development. The factory will be 1160 by 560 ft., and will have 649,000 sq. ft. of floor space.

**Packard Makes Appointments**—The Packard Motor Car Co. has appointed three district managers, Walter F. Schmitt for territory west of the Mississippi river, including Cincinnati, Ohio, and Memphis, Tenn.; O. E. Brown for territory east of the Mississippi river, with the exception of Cincinnati and Memphis, and C. E. Morton for a section of the Pacific coast.

**McHugh to Royal Flying Corps**—L. Cotter McHugh of the motor car spring department of the Detroit Steel Products Co., was to leave yesterday for Camp Borden, Canada, where he will be attached to the Royal Flying Corps. After three months' training he

**WILLYS-OVERLAND'S RECORD DRIVE AWAY—Here is just part of the record driveaway of 262 cars leaving the Willys-Overland factory for various points**

will be transferred to England and will have three months' additional training before going to France for active service.

**Hibbard Joins Ross**—V. S. Hibbard has joined the Ross Automobile Co. as manager of sales and advertising. Mr. Hibbard was formerly assistant sales manager of the Regal Motor Car Co.

**Wilson Truck Enlarges Plant**—The J. C. Wilson Co., Detroit, has completely remodeled the executive offices and the assembly floors of its motor truck plant. The expansion was caused by the addition of 1-ton and 3½-ton models.

**Duffield to Bailey Non-Stall**—J. E. Duffield has joined the Bailey Non-Stall Differential Corp., Chicago, as sales manager.

**New Factory Is Planned**—The Toledo Machine & Tool Co., Toledo, Ohio, has purchased 96 acres of land and will build a $500,000 factory to employ 2000 men.

**Timken Launches Tractor Department**—The Timken Roller Bearing Co., Canton, Ohio, has made additions to its plant which make it possible to establish a tractor bearing department. L. M. Klinedinst is manager of the new department.

**Tinkle U. S. Field Service Manager**—F. A. Tinkle has been appointed field service manager for the United States Motor Truck Co., Cincinnati, Ohio. He will visit the service forces of U. S. truck dealers and train them in standardized methods of rendering service.

**50,000 Republics in 1918**—The Republic Motor Truck Co., Alma, Mich., is making extensions and improvements to enable the company to build 50,000 motor trucks in 1918. The company built 7000 trucks in 1916 and is turning out 23,000 this year.

**Hackett Plans Location**—The Hackett Motor Car Co. will soon decide upon a location at Grand Rapids, Mich., for its new plant. Blue prints and complete specifications for the factory are ready, and construction will be started as soon as a satisfactory site is located.

**Redman Leaves Michelin**—J. E. Redman, assistant sales manager in the Chicago territory for the Michelin Tire Co., has resigned to become western sales manager for the Mutual Motor Stores Co. He will have charge of sales in Illinois, Indiana, Iowa, Michigan and Wisconsin.

## Recent Incorporations

**Appleton, Wis.**—Auto Body Works Co., to manufacture motor car and truck bodies, vehicles, etc.; capital stock, $5,000; incorporators, Humphrey Pierce, Gustav C. Seeger, Dudley Pierce.

**Abilene, Tex.**—Spaulding Automobile Co.; capital stock, $10,000; incorporators, John R. Spaulding, J. E. Spaulding and W. W. Anderson.

**Arcadia, Wis.**—Arcadia Motor and Supply Co.; capital stock, $15,000; incorporators, Otto A. Hohman, Casper A. Doenler and A. J. Berg.

**Aberdeen, Wash.**—Grays Harbor Motorship Corp.; capital stock, $50,000; incorporators, W. J. Patterson, A. Schubach, M. R. Ward, Bruce C. Shorts and A. B. Shay.

**Akron, Ohio**—North American Vehicle Co., to sell motor cars; capital stock, $25,000; incorporators, Fred C. Wood, J. B. Sieber, H. D. W. Mackayl, P. A. Martineau and B. J. Amer.

**Berea, Ohio**—Overland Berea Co., to sell motor cars; capital stock, $10,000; incorporators, Orlin D. Chase, Herbert A. Curtis, Hiram B. Kirkland, Albert A. Loomis, Sr., and Ralph A. Roth.

**Boston, Mass.**—Speedometer Parts Co.; capital stock, $25,000; incorporators, Rollin Abell,, president; F. W. Wyman, Mattapan, treasurer, and G. M. Greene.

**Brooklyn, N. Y.**—Atlas Auto Accessories Co., to manufacture motor car accessories and specialties; capital stock, $50,000; incorporators, J. T. Condon, G. A. McLaughline and F. X. Carmody.

**Cleveland, Ohio**—S. & N. Sales Co.; capital stock, $25,000; to sell motor cars; incorporators, Richard H. Lee, W. J. Patterson, Fleming H. Crew, Frank W. Cadwell and G. M. Gallagher.

**Cleveland, Ohio**—Reserve Mottor Car Co.; $10,000; to sell motor cars; W. T. Holliday, William A. McAfee, R. P. Cunningham, H. E. Brothers and L. A. M. Pejeau.

**Cleveland, Ohio**—Ohio Bethlehem Truck Sales Co.; $50,000; to sell trucks; C. R. Allport, J. B. Oviatt, E. J. Warrick, A. E. Rogers and M. G. Guhl.

**Cleveland, Ohio**—Turner Truck Sales Co.; $10,000; to sell trucks; Paul R. Turner, Randall R. Palmer, B. F. Turner, F. W. Stanton and J. A. Fenner.

**Cievenald, Ohio**—Austin Automobile Co.; $10,000; to sell motor cars; R. E. Westfall, H. M. Bennett, James Judge, E. K. Merwine and N. Bales.

**Chicago, Ill.**—Wright Motor Co., to manufacture an internal combustion engine; capital stock, $500,000; incorporators, Albert Schelble, Charles T. Cabrera, D. Rose.

**Columbus, Ohio**—Automatic Control Trailer Co., to build trailers and equip all trailers with an automatic braking device; capital stock, $25,000; incorporators, H. C. Rogers, John H. Price, S. A. Kinnear, C. W. Seaman and John C. Price.

**Cleveland, Ohio**—Ideal Tire & Rubber Co., $1,000,000; to sell tires; I. R. Davies, C. B. Hurd, R. C. Worrell, A. S. Davies and M. R. Davies.

**Coshocton, Ohio**—Crowthers Auto Sales Co.; $10,000; to sell motor cars; C. G. Beimgton, Fred Balmer, Jr., Beulah R. Balmer and Jessie C. Bevington.

**Cincinnati, Ohio**—Pfaff Motor Car Co.; $10,000; to sell motor cars; Frank L. Pfaff, McKemy D. Smith, Wm. D. Stanton, Jas. J. Smiley and B. A. Powell.

**Cleveland, Ohio**—Numatic Mfg. Co.; accessories; capital stock, $25,000; incorporators, M. Mabel Prentice, Esther M. Bradley, H. E. Sohul, Florence Sturtevant, Beatrice Friedman.

**Cleveland, Ohio**—Argue Lamp & Appliance Co., to manufacture lamps and accessories; capital stock, $100,000; incorporators, Oscar M. Sheck, F. L. Norman, C. R. Welch, Robert McLaughlin and E. P. Strong.

**Dallas, Tex.**—Southwestern Tire & Rubber Co.; capital stock, $250,000; incorporators, R. L. Cameron, W. W. Taxis, L. G. Murray, W. E. Shuttles and J. D. Gillespie.

**Dallas, Tex.**—John H. Dunn Tire Co.; capital stock, $10,000; incorporators, John H. Dunn, Will E. Looney and H. L. Selleck.

**Dallas, Tex.**—Federal Motor Co.; capital stock, $10,000; incorporators, George C. Chapman, George T. Burgess and L. S. Skelton.

**Detroit, Mich.**—Automobile Custom Shop; capital stock, $5,000; incorporators, R. L. Turner, J. E. Tankard and M. Coyle.

**Detroit, Mich.**—Kent Motors Co.; capital stock, $5,000; incorporators, Charles Wright, Jr., E. P. Snyder and J. L. Vette.

**Deshler, Neb.**—Deshler Auto Spring Wheel Co.; capital stock, $100,000; incorporators, W. Nance, Gregor Lange, H. Schlamann and H. J. Struve.

**Dover, Del.**—H. J. Graham Engineering Corp., to manufacture motor car engines and kindred specialties; capital stock, $35,000; incorporators, H. J. Graham, F. W. Unger and C. Y. Abbott.

**Enid, Okla.**—Oklahoma Auto Parts Co.; capital stock, $150,000; incorporators, G. E. Darland, M. E. Darland, L. M. Darland.

**Frankfort, Ky.**—Service Motor Co.; capital stock, $18,000; incorporators, James D. Roberts, Edwin Norris, Frank English and Alexander Bacon.

**Grand Island, Neb.**—Universal Puncture Proof Co.; capital stock, $20,000; incorporators, George W. Baughman, C. J. Doran and Edward Williams.

**Green Bay, Wis.**—Lawson Aircraft Co., to manufacture airplanes, engines, etc.; capital stock, $10,000; incorporators, George W. Ellis, John P. Hoberg and William Jessen.

**Greenville, Va.**—National Garage, Inc.; capital stock, $25,000; incorporators, W. S. Atkins, J. M. Hines.

**Kansas City, Mo.**—Tire and Service Company; capital stock, $15,000; incorporators, C. G. Vogel, G. W. Vogel and A. D. Vogel.

**Lynchburg, Va.**—Double Action Tire Pump Co.; capital stock, $50,000; incorporators, J. R. Ford, A. T. Henderson.

**Lexington, Va.**—Blue Front Garage, Inc.; capital stock, $15,000; incorporators, J. N. Holtinger, Murat, Va.; F. W. McCluer.

**Lansing, Mich.**—Desmond Pneumatic Starter Co.; capital stock, $50,000; incorporators, John E. Desmond, Nathaniel Victor, Harry Lipshitz.

**Lima, Ohio**—Heiniger Auto Sales Co., to sell motor cars; capital stock, $25,000; incorporators, H. K. Heiniger, E. C. Mack, Ross W. Foster, F. R. Pangle and Claudie Young.

**Milwaukee, Wis.**—Standard Racine Rubber Co., to deal in tires, tubes, accessories, etc.; capital stock, $75,000; incorporators, Stuart Webster, H. C. Severance and R. Y. Cooke.

**Milwaukee, Wis.**—Alfred Reeke Co., to deal in new and used cars, etc.; capital stock, $25,000; incorporators, Alfred Reeke, Roy W. Osborn and T. H. Spence.

**Middlefield, Ohio**—Charles Valve Remover Co., to remove valves; capital stock, $10,000; incorporators, Charles Wilkerson, W. S. Clark, O. A. Hopkins, F. N. Griffin and E. H. Brigden.

**New York**—Couchois Tire Corp., to manufacture tires; capital stock, $50,000; incorporators, Garrett J. Couchois, Rudolph Tiktin, Joseph Klingenstein.

**Norfolk, Va.**—Guardian Motors Co., motor car business; capital stock, $9,000,000; incorporators, C. F. Gazley, B. C. Brownell.

**Norfolk, Va.**—Universal Auto Sale and Service Co.; capital stock, $10,000; incorporators, M. L. Levy, R. J. B. Page.

**Omaha, Neb.**—Foshier Bros. & Dutton, to manufacture, buy and sell motor cars, trucks, tractors and accessories; capital stock, $10,000; incorporators, W. E. Foshier, E. E. Foshier and C. J. Dutton.

**Richmond, Va.**—Kelly Auto Supply Co.; capital stock, $50,000; incorporators, John L. Kelly, E. Dennis.